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BART Impact Program

IMPLICATIONS OF BART'S IMPACTS FOR THE TRANSPORTATION DISADVANTAGED

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BART IMPACT PROGRAM

IMPLICATIONS OF BART'S IMPACTS
FOR THE TRANSPORTATION DISADVANTAGED



FINAL REPORT

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Prepared for

U.S. DEPARTMENT OF TRANSPORTATION

And

U.S. DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
WASHINGTON, D.C.

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SPONSOR'S NOTE

The BART Impact Program was a comprehensive, policy-oriented study and evaluation of the impacts of the San Francisco Bay Area's new rapid transit system (BART). The program began in 1972, and was completed in 1978. Financing for the Program was provided by the U.S. Department of Transportation, the U.S. Department of Housing and Urban Development, and the California Department of Transportation. Management of the Federally-funded portion of the Program was vested in the U.S. Department of Transportation (DOT). The Metropolitan Transportation Commission (MTC), a nine-county regional agency established by California law in 1970, administered the Program as prime contractor to DOT; the research was performed by competitively selected subcontractors to MTC.

The BART Impact Program studied the broadest feasible range of potential rapid transit impacts, including impacts on traffic flow, travel behavior, land use and urban development, the environment, the regional economy, social institutions and life styles, and public policy. The incidence of these impacts on population groups, local areas, and economic sectors was measured and analyzed.

The results of the BART Impact Program have been synthesized in BART in the Bay Area, the BART Impact Program Final Report (PFR). That report was prepared by MTC and presents MTC's conclusions from and interpretation of the Program's findings. In addition to the PFR, final reports for each of the individual projects in the Program were prepared by the consultants who conducted the research. The reports are listed at the end of this Note. The final reports are supported by numerous technical memoranda and working papers. The conclusions in those documents reflect the viewpoints of the respective consultants based on their research.

Readers of BART Impact Program reports should be aware of the circumstances and the setting in which BART was planned and built and the conditions under which the Program was conducted. An understanding of these factors is critical for interpreting the Program's findings and attempting to apply them to other areas.

First, it is important to note that the San Francisco Bay Area has a sound economy, a good system of highways and public transportation, and distinctive land use and development patterns shaped by the Bay and the hills around it. BART was approved and built during a period of vigorous growth in the Bay Area. The economy was expanding, suburban development was burgeoning, and major increments of highway capacity were being added. Also, the Bay Area already had extensive public transportation services. There were public carriers operating dense networks of local transit services on both sides of the Bay, and there was frequent transbay bus service from many parts of the East Bay to San Francisco. In 1972 before BART opened, approximately 10% of the total daily trips in the three BART counties were made on transit. All of these factors made it difficult in the study to isolate BART's effects from other influences that were affecting such things as travel behavior and urban development.

A second important point is that BART was planned and designed primarily to facilitate travel from outlying suburbs to downtown areas. Multiple stops are provided in the major central business districts, but in other respects BART is

more like a commuter rail system (with long lines and widely-spaced stations) than a New York or Chicago-style subway system of interlocking crosstown lines and frequent stops. The BART system was intended to rival the automobile in comfort, speed, and convenience. Contemporary issues like energy conservation, air quality and service for the transportation disadvantaged were not widely recognized and publicized concerns during the period of BART's design.

The institutional setting in the Bay Area was a third important influence on BART's development. BART was developed as a separate institution without full coordination among existing transportation and regional development planning agencies. BART's planners had to make assumptions about policies and development, many of which turned out to be contrary to policies ultimately adopted by municipalities in the BART District.

A critical element in the study design of the BART Impact Program was the definition of the No-BART Alternative (NBA), the regional transportation facilities and travel patterns judged most likely to have evolved by 1976 if BART had not been built. The definition of an NBA was essential since the Program defined an impact as the difference between what actually occurred with BART and what would have resulted without BART. One cannot be certain about what the region would have been like had BART not been built. But based on an analysis of the political and economic decision history of the Bay Area and the professional judgment of those involved in the Program, it was determined that no significant changes to the area's freeway and bridge systems as they actually were in 1976 would have occurred without BART. It was concluded further that the public transit network and services would have been very similar to what they were just before the start of BART transbay service. One consequence of this assumption is that the NBA provides lower levels of service and less capacity than the with-BART system, and attracts fewer riders. The NBA does not extrapolate beyond 1976 and does not consider how much additional capacity in the transportation system might eventually have been required because of increasing travel demand and congestion.

An important factor affecting the findings was that BART was not operating at its full service level during the period of study by the BART Impact Program. The frequency of trains, their operating speeds, the reliability of their operations, and the capacities provided in peak periods of travel by BART were considerably lower than those originally planned. Trains were running on 12-minute headways instead of the 4.5 minutes originally planned for each of the four lines (90 seconds where three lines converged). BART did not initiate service on all lines simultaneously in 1972 but instead phased in service. The most critical link, the Transbay Tube, was not opened until late 1974. Night service did not start until the end of 1975, and Saturday service started in 1977. Direct Richmond to Daly City service still is not operating, and it now appears that "full service levels," when they are attained, will not achieve the headways and average speeds announced in the original plans.

The final point is that BART had only been operating for a relatively short period of time when its impacts were studied. The impact assessment largely depends on data collected in the first four years of BART's operations. It is likely that some of its impacts, particularly those relating to urban development, will require more time to mature.

Final Reports

These documents are available to the public through the National Technical Information Service, Springfield, VA 22151:

Metropolitan Transportation Commission, "BART in the Bay Area. The Final Report of the BART Impact Program," MTC, 1979.

Gruen Associates, Inc. and DeLeuw, Cather & Company, "Environmental Impacts of BART," MTC, 1979.

Peat, Marwick, Mitchell & Co., "BART's First Five Years: Transportation and Travel Impacts," MTC, 1979.

Jefferson Associates, Inc., "Impacts of BART on Bay Area Institutions and Life Styles," MTC, 1979.

McDonald & Greife, Inc., "The Economic and Financial Impacts of BART," MTC, 1979.

John Blayney Associates/David M. Dornbusch & Co., Inc., "Land Use and Urban Development Impacts of BART," MTC, 1979.

Booz, Allen & Hamilton Inc., "The Impact of BART on Public Policy," MTC, 1979.

Urban Dynamics Associates, "Implications of BART's Impacts for the Transportation Disadvantaged," MTC, 1978.

Alan M. Voorhees & Associates, Inc., "Federal Policy Implications of BART," DOT, 1979.

- BART:** The Bay Area Rapid Transit System
- Length:** The 71-mile system includes 20 miles of subway, 24 miles on elevated structures and 27 miles at ground level. The subway sections are in San Francisco, Berkeley, downtown Oakland, the Berkeley Hills Tunnel and the Transbay Tube.
- Stations:** The 34 stations include 13 elevated, 14 subway and 7 at ground level. They are spaced at an average distance of 2.1 miles: stations in the downtowns are less than one-half mile apart, while those in suburban areas are two to four miles apart. Parking lots at 23 stations have a total of 20,200 spaces. There is a fee (25 cents) at only one of the parking lots. BART and local agencies provide bus service to all stations.
- Trains:** Trains are from 3 to 10 cars long. Each car is 70 feet long and has 72 seats. Top speed in normal operations is 70 mph with an average speed of 38 mph including station stops. All trains stop at all stations on the route.
- Automation:** Trains are automatically controlled by the central computer at BART headquarters. A train operator on board each train can override automatic controls in an emergency.
- Magnetically encoded tickets with values up to \$20 are issued by vending machines. Automated fare gates at each station compute the appropriate fare and deduct it from the ticket value.
- Fares:** Fares range from 25 cents to \$1.45, depending upon trip length. Discount fares are available to the physically handicapped, children 12 and under, and persons 65 and over.
- Service:** BART serves the counties of Alameda, Contra Costa and San Francisco, which have a combined population of 2.4 million. The system was opened in five stages, from September 1972 to September 1974. The last section to open was the Transbay Tube linking Oakland and the East Bay with San Francisco and the West Bay.
- Routes are identified by the terminal stations: Daly City in the West Bay, Richmond, Concord and Fremont in the East Bay. Trains operate from 6:00 a.m. to midnight on weekdays, every 12 minutes during the daytime on three routes: Concord-Daly City, Fremont-Daly City, Richmond-Fremont. This results in 6-minute train frequencies in San Francisco, downtown Oakland and the Fremont line where routes converge. In the evening, trains are dispatched every 20 minutes on only the Richmond-Fremont and Concord-Daly City routes. Service is provided on Saturdays from 9 a.m. to midnight at 15-minute intervals. Future service will include a Richmond-Daly City route and Sunday service.* Trains will operate every six minutes on all routes during the peak periods of travel.
- Patronage:** Approximately 146,000 one-way trips are made each day. Approximately 200,000 daily one-way trips are anticipated under full service conditions.
- Cost:** BART construction and equipment cost \$1.6 billion, financed primarily from local funds: \$942 million from bonds being repaid by the property and sales taxes in three counties, \$176 million from toll revenues of transbay bridges, \$315 million from federal grants and \$186 million from interest earnings and other sources.

March 1978

*Sunday service began in July, 1978

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SUMMARY

THE IMPLICATIONS FOR THE TRANSPORTATION DISADVANTAGED PROJECT

This is the final report of the Implications for the Transportation Disadvantaged Project (ITD) of the BART Impact Program. The purpose of the ITD Project has been to develop the implications of the experience with rapid rail in the Bay Area for the transportation disadvantaged. This study has analyzed the effects of BART on three special population groups — ethnic minorities, the elderly and the physically and mentally disabled. These groups have been the focus of the project in light of either certain general disadvantages vis-a-vis society (income, education, employment, etc.) or specific mobility related disadvantages (transit dependency, physical disability, etc.). For both these reasons, these population subgroups are a special concern in transportation planning, particularly in an equity sense.

DEMOGRAPHIC CHARACTERISTICS OF THE TRANSPORTATION DISADVANTAGED

The pattern of BART's impacts on the transportation disadvantaged and the implications of rapid rail for these groups are shaped not only by attributes of the rapid rail transportation facility and operations, but also by characteristics of the disadvantaged population:

- population size, locational distribution, and growth trends, and
- employment and income characteristics.

The ethnic minority community of the Greater BART Service Area (San Francisco, Alameda, Contra Costa and northern San Mateo Counties) represents nearly one-third (31.9%) of the approximately 2.5 million persons living in the area. The Spanish-heritage population constitutes the largest of the principal ethnic minority subgroups (12.7%), followed by Blacks (11.8%) and Asians (7.4%). Approximately 9.7% or 240,000 persons living in this service area are 65 years of age or older. There is no reliable and useful estimate of the number of residents who are disabled.

Population trends have shown the greatest growth in the suburban areas of the region. However, the ethnic minority population is growing at a rate greater than the majority White population, with increasing concentrations in the central cities of San Francisco and Oakland.

While the BART system is a regional system, primarily designed to serve trips from outlying residential areas to the central cities, there are a larger number of ethnic minority persons living near BART lines and stations located in the older urban areas located close into the central business districts of the central cities.

Of the thirty-four BART stations, eighteen are located in areas classified as having a high concentration of ethnic minorities (40%+); only two of these are in suburban areas. Eight BART stations are located in areas where there are relatively high concentrations of elderly (15%+); four of these are in the downtown areas of the region.

Among the transportation disadvantaged, particularly Black and Spanish-heritage minorities, household income and educational levels are considerably lower than for the majority White population. Lower income minorities have lower total employment rates in the region and in the case of Blacks in the San Francisco downtown, and Spanish-heritage in the Oakland downtown, lower levels of employment in these employment centers best served by BART.

FINDINGS OF ISSUE INVESTIGATION: BART'S IMPACTS ON THE TRANSPORTATION DISADVANTAGED

Analyses of BART's impacts conducted in each of the six major project areas of the BART Impact Program have been applied in the investigation of a set of twenty-three issues related to the range of potential impacts of BART on the transportation disadvantaged. Issue investigations have been conducted in four broad impact areas:

- Environment
- Mobility and Accessibility
- Economic, Employment and Finance
- Land Use and Urban Development.

BART's Environmental Impacts on the Transportation Disadvantaged

The major findings of the investigation of six issues related to the possible environmental impacts of the BART system on the transportation disadvantaged are:

- For the population as a whole, including the disadvantaged population, BART has had negligible regional environmental impact, e. g., no measurable improvement impact on air quality. Most noticeable environmental impacts, including both negative and positive, have been restricted to the immediate vicinity of BART lines and stations, but these have also been relatively minor.
- The two principal negative environmental impacts of BART in both disadvantaged and non-disadvantaged areas have been (a) parking and traffic problems around stations where auto access levels are high, and (b) noise levels in some portions of the system, particularly along aerial line segments. Negative impacts of BART's operations are generally somewhat more intense in predominantly non-minority suburban areas where auto access levels are higher and aerial line segments more common. However, on-street parking by BART commuters living outside the station area is a problem in several minority areas where inadequate off-street parking capacity has been provided.
- Negative environmental impacts stemming from BART's operations are generally less common in minority areas. However, where they do occur they affect more people than would a comparable impact in suburban areas due to typically higher population densities in the older, urban residential areas where minorities live in the greatest concentrations.
- The fact that BART's operations create relatively minor environmental impacts is particularly important for the disadvantaged population. A different rail system located where BART is, but less sensitively designed than BART

with respect to possible negative environmental impact avoidance, would have affected the lower-income ethnic minority community disproportionately due to its greater population concentrations in the urban segments of the corridor.

- Construction impacts were generally of longer duration and more severe in minority areas where subway construction was more extensive. However, operations of subway segments produce virtually no negative environmental impacts once constructed.

BART's Mobility and Accessibility Impacts on the Transportation Disadvantaged

Major findings from the study of five mobility and accessibility issues are summarized below.

- BART's impact on area travel has been far less than was expected in the planning for the system. BART's share of the approximately 25 million weekday trips made in the Greater BART Service Area, consisting of San Francisco, Alameda, Contra Costa Counties and the northern portion of San Mateo County, is about 2 percent.
- The overall impact of BART on the mobility of the transportation disadvantaged, as well as the non-disadvantaged population, has been relatively small to date. Ethnic minority ridership on the system is roughly representative of minority representation in the regional area; however, it is significantly lower for low-income minority persons who are the most clearly transportation disadvantaged.
- BART has provided significant new mobility gains for a fairly small segment of the region's population — the suburban resident commuting to the downtown areas of the region. BART's share of longer distance travel from the outlying residential areas to the San Francisco and Oakland CBDs is substantially higher than its share of total area trip-making.

- The minimal effect of BART on improved transit accessibility for lower income ethnic minorities results from the fact that BART does not represent significant travel time or out-of-pocket travel cost savings for most of these residents over bus and streetcar services provided in these areas. This appears to be true despite a higher degree of residential proximity to BART stations in central urban areas, as well as greater transit dependency.
- The transportation disadvantaged continue to rely heavily on buses and streetcars to serve their mobility needs. The maintenance of adequate levels of bus and streetcar services at reasonable fares is critical in order to assure an acceptable level of mobility for the transportation disadvantaged.
- BART has shown that extensive consideration of the disabled and the elderly with mobility impairments in the design of mass transportation facilities can result in a relatively barrier-free transit system. However, use by the handicapped will probably be relatively low due to the fact that there remain substantial obstacles to barrier-free travel in the total environment, including some inherent to a rapid rail facility (e.g., size of station areas). Outside the system, the lack of barrier-free feeder bus services, absence of curb-cuts, and inaccessible buildings constrain travel by the severely disabled.

BART's Economic, Employment and Financial Impacts on the Transportation Disadvantaged

The study of six issues relating to BART's economic impacts on the transportation disadvantaged may be summarized:

- BART, as a new element in the transportation system, apparently has had a relatively minor impact on the economic growth of the area or the shifting regional distribution of economic activities. This overall conclusion generally applies to both minority and non-minority areas of the region.

- The lack of significant impacts on economic activity is closely related to the small effect BART has had on regional accessibility. Average travel times have not been significantly improved over those provided by other travel modes, i.e., bus and especially auto travel. Accessibility gains have been the least in the urban areas close into the downtowns of the central cities where the transportation disadvantaged live in the greatest concentrations. In these areas, BART has had nearly no measurable economic impact to date.
- The principal economic benefit provided by BART for transportation disadvantaged households has been direct employment during construction of the system and during its continuing operations. These effects have been limited by (a) hiring patterns during construction in which minorities were mostly employed in laborer positions, and (b) the relatively small share of the total regional work force employed by BART in its operations.
- Since BART's economic benefits have not been found to extend much beyond its direct benefits for BART users, primarily commuters, the incidence of the burden of paying for the system is of major interest in the implications of the system for the transportation disadvantaged. Frequent users of BART represent a fairly small segment of the area's population. A large segment of the population do not receive either direct mobility benefits or indirect economic benefits, but pay the same property and sales taxes as the user group. The low-income transportation disadvantaged, particularly low-income Blacks, makeup a disproportionately large share of the non-user group. In terms of who benefits and who pays, the fact that BART has generated few external benefits has implied that this regional rapid rail system has represented a fairly inequitable form of public transportation investment for the area, and particularly for the low-income transportation disadvantaged.

BART's Land Use and Urban Development Impacts on the Transportation Disadvantaged

Six issues related to BART's land use impacts on the transportation disadvantaged have been examined in the ITD Project. Additional findings relevant to BART's property value and population distribution impacts on the transportation disadvantaged will be available with the completion of the Land Use and Urban Development Project. The major findings of the ITD Project have included:

- The lack of measurable land use impacts related to BART is in part a result of the minimal effect BART has had on regional accessibility patterns. Correspondingly, the regional distribution of development activity has not been substantially affected by the introduction of BART into an area where the automobile continues to shape land use patterns. In the urban residential areas of the central cities where ethnic minorities live in the largest numbers, the impact of BART on the potential for new development, redevelopment or rehabilitation has been the least.
- Land use policies supportive of new development and rehabilitation around station areas have been more difficult to implement, and less effective than expected during the planning phase of BART. This has been especially true in minority areas where more restrictive zoning has been implemented around a significant number of stations after BART's planning or construction, in many cases in response to neighborhood concerns.
- The BART experience has shown that there may be significant divergence in land use objectives among planners, developers and residents for neighborhoods where a rapid rail facility is introduced. This is true even in the older, physically deteriorating, urban area with significant concentrations of low-income minorities.

IMPLICATIONS OF BART'S IMPACTS FOR THE TRANSPORTATION DISADVANTAGED

Two types of implications have been considered in the ITD Project:

- Effectiveness Implications
- Policy-Oriented Implications.

Effectiveness Implications

The implications of the extent of BART's effectiveness in fulfilling various objectives related to the special concern for the transportation disadvantaged have been developed in the ITD Project. Three alternative perspectives based on differing social, political and economic values are reflected — objectives of BART planners, general planning objectives, and the disadvantaged perspective.

Objectives of BART Planners: The objectives of BART planners were more or less limited to system-oriented objectives, principally increasing the capacity of travel corridors to the downtown centers. Some of the limitations on BART's travel service benefits for the low-income transportation disadvantaged are largely the result of the fact that planning objectives were not formulated in terms of group-specific benefits of impacts. Planning for BART occurred prior to the emphasis on the special needs of the transportation disadvantaged currently reflected in Federal planning requirements for major transportation investments in metropolitan areas.

General Planning Objectives: A summary of the principal implications regarding the overall effectiveness of BART in terms of the general planning objectives includes consideration of (a) the net level of benefits generated, and (b) the incidence of their distribution.

As an innovative, major new element in the region's transportation system, BART's measurable positive impacts to date have been unexpectedly low in terms of regional system effects, benefits to the general population, or benefits to the transportation disadvantaged of the area. The findings of all the major project

areas of the BART Impact Program indicate that the benefits of BART, as a fixed-route, rapid rail commuter-oriented system have so far been essentially restricted to direct mobility impacts. These have been limited to a relatively small segment of the BART District population. The highest level of benefit has accrued to the more affluent, predominantly White suburban residents who work in the downtown areas of the region.

The principal implication for the transportation disadvantaged emerging from the BART experience relates to the commuter-oriented attributes of the system. For rapid rail systems, or line segments of such systems, which are designed to primarily serve outlying areas of a metropolitan area, a relatively low level of direct mobility benefit, as well as negligible indirect benefits, may be anticipated for the low-income population living in the greatest concentrations in the central urban areas of the region.

Disadvantaged Perspective: The special interests of the transportation disadvantaged and BART implications for these groups have been examined in terms of the extent to which BART has contributed to reducing existing social and economic inequities. BART has not generated a "progressive" distribution of benefits, i. e., greater benefit to the neediest. This suggests that had BART been planned with the disadvantaged perspective as an explicit part of the planning process, a different transportation system may have been selected. Since the inner cities, where many of the low income and minority disadvantaged live, were already served by extensive bus systems, one element of the alternative plan may have been an expansion of that system designed to increase their mobility.

Policy-Oriented Implications

There are four policy areas in which the BART experience suggests important implications for major transportation investment planning and policy:

Planning Process: The most important policy implications of BART for the transportation disadvantaged are related to the planning process in which rail systems may be considered. BART's implications for the transportation disadvantaged are found in a number of aspects of the planning process:

- goals must be defined with sensitivity to a diversity of values and policy concerns,

- participation should include a range of community interests in all phases of the planning process, including those of the low-income and other transportation disadvantaged,
- the scope of alternatives should be broad and consider alternative technologies, and
- evaluation of alternatives should include clear estimation of group-specific impacts, particularly as these relate to the special concerns of the disadvantaged.

Design and System Configuration: Once a decision has been made to implement a fixed-route rail system, a number of policy-oriented implications of the BART experience are relevant for the transportation in the design of the system. Determination of the areas to be served, auto, bus and other access and egress mode provisions; and the configuration of line segments and stations will affect the level and nature of impacts of the system on the transportation disadvantaged. Many design decisions will involve important trade-offs between competing objectives relevant to the transportation disadvantaged.

Operational Policy: With the exception of the disabled, operational attributes of a rapid rail system appear to be of less importance for the transportation disadvantaged than system design characteristics like service area delineation or station location. However, off-peak, evening, and weekend service levels may be more important for the transportation disadvantaged than for the general population, because of greater transit dependency and different travel needs.

Financial Plan: In order to achieve an equitable balance between the benefits received and the costs assumed by different population groups, the financing plan of a major transportation investment should require that frequent users of the system, as well as the property owners most directly benefited, pay a larger share of system costs than they do in the case of BART. This is implied due to the relatively minor indirect economic, environmental or social benefits which may be expected for the substantial portion of the metropolitan population, including a large number of low income persons. Higher fares for longer distance travel, special benefit tax district, or tolls levied on auto use in the corridors served, are alternatives which should be evaluated in order to promote a balance between benefit and burden.

Equity considerations also imply that revenue sources to finance capital costs and operating deficits should be based on the principle of progressive taxation — increasing proportion of income as income increases. This objective is especially significant in the case of a regional commuter-oriented rapid rail system like BART, where higher ridership rates among the more affluent segments of the regional population may be expected. Special efforts may be required to assure that the methods of financing projected operating deficits will be based on the progressive concept of taxation according to the ability to pay.

I. INTRODUCTION

BART Impact Program

Built at a cost of \$1.6 billion, the Bay Area Rapid Transit (BART) system is a major element in the San Francisco Bay Area program of transportation development. As the first regional rapid transit system to be built in this nation in more than 50 years, BART is of great interest to the Bay Area, other metropolitan areas across the country that are considering investments in improved transportation, and to the Federal government which is providing financial aid for transportation improvements, urban development and environmental protection. Considering the magnitude of these concerns, there is a great need for accurate information on the impacts on the Bay Area resulting from the BART investment. Analyses and interpretations of BART impacts can be of vital assistance to those responsible for future transportation policy decisions throughout the nation.

The United States Department of Transportation (DOT) and the Department of Housing and Urban Development (HUD) have sponsored and are funding a long-term, policy-oriented study and evaluation of the impact of the new 71-mile BART in the San Francisco-Oakland metropolitan area. The program is being managed by the area's Metropolitan Transportation Commission (MTC). The program, initiated in 1972, is expected to be completed in 1978. Projects are being prepared by consulting firms, universities, research institutions, and public agencies working under contract with MTC and, in some cases, by MTC itself.

The BART Impact Program (BIP) has been designed to cover the entire range of possible impacts associated with the construction and operation of the BART system. Six major project areas have served to organize evaluation of BART's impacts:

- Transportation System and Travel Behavior.
- Land Use and Urban Development.
- Economics and Finance.
- Environment.
- Public Policy.
- Institutions and Lifestyles.

Additionally, three special projects have been established to integrate the findings of the major project studies in order to focus on the important implications of the BART experience:

- Implications for the Transportation Disadvantaged.
- Federal Policy Implications.
- Local Policy Implications.

Implications for the Transportation Disadvantaged Project (ITD)

PURPOSE OF ITD PROJECT

The overall purpose of the Implications for the Transportation Disadvantaged Project has been to provide group-specific evaluation of the range of BART impacts studied in the BART Impact Program. The ITD study has been organized to address certain key questions about the effects of BART's construction and operations:*

- What impacts have occurred?
- Where are they occurring?
- Who is affected?
- Are the disadvantaged disproportionately affected?

SPECIAL POPULATION GROUPS STUDIED

In Phase I of the ITD Project, consideration was given to the question of which population groups constitute the transportation disadvantaged.** The conclusion of this study was that only a tenuous case can be made that all members of any general population subgroup can be considered transportation

* Urban Dynamics Associates. Project Implementation Plan: Implications for the Transportation Disadvantaged Project. BART Impact Program. Document No. DOT-BIP-PD 30-10-77. Metropolitan Transportation Commission, Berkeley. November, 1977.

** McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

disadvantaged solely by virtue of their membership in that group. However, since as a group — the poor, the elderly, ethnic minorities, women and youth evidence certain general disadvantages vis a vis society, or specific mobility-related disadvantages, these groups represent a special concern in transportation planning.

In order to provide a reasonable scope for the study, it was determined in Phase I that the focus of the ITD Project should be restricted to:*

- ethnic minorities,
- the elderly, and
- the handicapped.

The impacts of a new rapid rail transportation facility are of interest for these groups for similar, but somewhat distinct reasons. All three groups are typically characterized by lower income levels than the general population. Additionally, the reason to study BART's impacts on elderly and handicapped is their impaired mobility due to physical or other disabilities. Ethnic minorities are of special interest for the evaluation of a major public investment in terms of equity considerations, and because differences in culture, lifestyles, and economic status may influence the ways in which they are affected by impacts, perceive or respond to BART's facilities, operation, policies, financing and other effects.** Additionally, since BART was primarily designed to serve long distance travel from outlying sections of the Bay Area, an overall concern is the extent to which it also serves the special transportation needs of the disadvantaged population who live in the greatest concentrations in the central cities of the region.

* McGuire, Chester. Implications for the Transportation Disadvantaged: Research Plan, BART Impact Program. Document No. DOT-BIP-PD 28-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

** McGuire, Chester. The Special Study of Ethnic Minorities in the BART Impact Program, Document No. DOT-BIP-WP 28-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

Ethnic Minorities

BART's implications for the low-income, ethnic minority population of the Bay Area is the primary emphasis of the ITD study. The ethnic groups studied in the ITD Project are those which makeup the three principal minority populations of the San Francisco Bay Area:

- Spanish-heritage,
- Blacks, and
- Asians (Chinese, Japanese and Filipinos).

Other minority groups are represented to a significantly lesser extent in the Bay Area population and include other orientals (e.g. Korean, Vietnamese) and Native Americans. Where data are available, persons in these groups are included in the analysis of BART impacts on the total minority population of the Bay Area. It has been an objective of the ITD Project to apply consistent definitions of specific ethnic minority groups in all analyses of BART's impacts. However, due to variations in the classification of data found in the many information sources used in the study, this has not always been possible and is noted in the discussion of specific impact analyses where applicable.

Elderly

The elderly population is defined to be those persons 65 years of age or older. This transportation disadvantaged group is of particular interest due to generally low-fixed annual incomes and high incidence of mobility impairing disabilities. It is estimated that over sixty-five percent of the non-institutionalized handicapped population in the United States are 65 years of age or older.*

* McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976. Source: U.S. Department of Health, Education and Welfare, National Center for Health Statistics, 1969. Series 10, No. 78. December, 1972.

Handicapped

The ITD study's focus on the handicapped population is for those individuals with physical, mental or emotional disabilities which restrict or preclude use of conventional private or public transportation facilities. These include:

- Non-ambulatory disabilities,
- Semi-ambulatory disabilities,
- Functional disabilities,
- Sight and Hearing disabilities, and
- Developmental disabilities.

For the severely handicapped individual, these are often numerous problems in addition to the specific handicap itself: advanced age, low income, and lack of specific work skills or education.

SCOPE AND METHODOLOGY OF ITD PROJECT

Analyses of BART's impacts conducted in each of the six major project areas of the BART Impact Program have been applied in the ITD Project in order to investigate a set of issues encompassing the entire range of BART's potential impacts on the transportation disadvantaged. Issue investigations have been conducted in four broad impact areas; an interim technical memorandum or working paper has been prepared reporting the results of study in each of these work elements of the ITD study:*

* Urban Dynamics Associates. Implications of BART's Environmental Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 34-10-78. Metropolitan Transportation Commission, Berkeley. January, 1978.

Urban Dynamics Associates. Implications of BART's Mobility and Accessibility Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 35-10-78. Metropolitan Transportation Commission, Berkeley. April, 1978.

Urban Dynamics Associates. Implications of BART's Economic, Employment and Financial Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 36-10-78. Metropolitan Transportation Commission, Berkeley. March, 1978.

Urban Dynamics Associates. Implications of BART's Land Use and Urban Development Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-WP 56-10-78. Metropolitan Transportation Commission, Berkeley. April, 1978.

- Environmental,
- Mobility and Accessibility,
- Economic, Employment and Financial, and
- Land Use and Urban Development.

In each of these reports, a set of issue statements which were designated in Phase I of the ITD Project have been investigated in order to provide the basis for identifying the implications of the BART experience for the transportation disadvantaged. In all, twenty-three issue statements were tested as hypotheses about BART's impacts on the transportation disadvantaged. The best information available from the six major project areas of the BART Impact Program, other BART studies, or primary data sources where necessary have been applied in the issue investigation study.

The specific issues examined in each of the major impact areas of the ITD Project are:

Environmental

- 1-1. Has BART significantly reduced the quality of life in ethnic minority residential neighborhoods around the stations by creating parking problems, increasing automobile congestion, or increasing traffic safety hazards?
- 1-2. Has BART's environmental intrusion, e. g. noise, vibration, and loss of privacy, been an especially strong negative factor in ethnic minority areas?
- 1-3. Do BART tracks constitute a barrier as they pass through ethnic minority communities?
- 1-4. Has personal security of BART users been a problem in minority areas, particularly during evening hours? Are there differences in the level of surveillance and protection provided in minority areas? Are there differences in the way minorities, the elderly and the handicapped perceive personal security?

- 1-5. Have BART construction activities caused greater disruption in ethnic minority communities over a more prolonged time period than in non-minority communities? Upon completion of BART on the other hand, are adverse long-term environmental effects less in minority than non-minority communities?
- 1-6. Has BART improved the environmental quality of communities around stations with related street improvement projects, beautification programs, parks and landscaping, including passive and active recreational facilities?

Mobility and Accessibility

- 2-1. Has BART improved accessibility to employment opportunities for the transportation disadvantaged?
- 2-2. Has BART provided ethnic minorities, handicapped and elderly with improved access to the area's social, medical, cultural and recreational facilities and events?
- 2-3. What is the level and significance of BART use by ethnic minorities? Specifically, a) Are minority BART riders representative of the size and socio-economic composition of the service area minority population? b) Do minorities use the system less than one would expect? c) Are ridership rates from stations located in minority areas less than those located in non-minority areas? and d) What attributes of BART best explain the level of BART usage by minorities?
- 2-4. Has BART operation adversely affected minorities by causing reductions in AC transit and MUNI service in ethnic minority areas?
- 2-5. Has BART's potential benefit for the handicapped been realized with the provision of a largely barrier-free rapid rail facility?

Economic, Employment and Financial

- 3-1. Does BART provide increased opportunity of employment for minority central city residents by increasing accessibility to outlying suburban office, commercial and industrial areas?
- 3-2. Is BART a catalyst for minority business enterprises and minority employment in and around the stations?
- 3-3. What has been the level and significance of BART's direct employment for minorities?
- 3-4. Has BART lead to higher property taxes around stations which, in turn, force out ethnic minorities and the elderly?
- 3-5. Has BART's financing plan implied a disproportionate burden for low income persons, e.g. ethnic minorities, handicapped and the elderly?
- 3-6. Is BART's fare policy inequitable in terms of user cost per mile, and if so, does this affect ethnic minorities to a greater degree than the general population?

Land Use and Urban Development Issues

- 4-1. Has BART contributed to an increase in the concentration of ethnic minorities in the central cities?
- 4-2. Has BART encouraged middle-income minorities to move to suburban areas?
- 4-3. Has BART contributed to a physical upgrading of areas around stations in minority areas by stimulating new construction, rehabilitation, or remodeling of residences and businesses?
- 4-4. Has BART encouraged higher densities around stations which, in turn, have lead to the displacement of minority and disadvantaged households?

- 4-5. Have BART's impacts on real estate values around stations, including speculation, affected residents in minority neighborhoods negatively?
- 4-6. Has BART encouraged more shopping downtown at the expense of shopping districts in ethnic communities?

The assessments of BART's impacts on the transportation disadvantaged have been based on the various analyses conducted in each of the six major BIP project areas. It has been the purpose of the ITD Project to integrate the findings of these separate BIP project areas as they relate to the special concern for the transportation disadvantaged. Thus, the ITD Project has been largely dependent on the data collection and analyses conducted in other BIP projects. The BIP projects have been based on behavioral and attitudinal surveys of samples of population groups which have been affected by the BART experience or participated in it — planners, local officials, business leaders, merchants, area travelers, BART users, employees, homeowners and renters, students, etc..

The results of two surveys conducted in the BIP have been of special interest for the ITD Project. Special tabulations from the data files developed in these surveys have been conducted for the ITD Project by the consultant with the assistance of MTC staff:

- 1976 BART Passenger Profile Survey: The Passenger Profile Survey is an annual on-board survey of BART patrons designed to provide statistically reliable information about the demographic characteristics and travel behavior of users of the system. Of particular interest for the ITD Project, estimates based on observational census of the sample were used to adjust the data for differential response rates by BART passengers of different ethnic groups.
- 1977 Workplace Survey: A survey of journeys to work conducted in June, July and August 1977 as part of the Transportation System and Travel Behavior (TSTB) Project. The survey included a nine-county region composed of 440 planning analysis zones used by both the Metropolitan Transportation Commission (MTC) and the

Association of Bay Area Governments (ABAG) for planning purposes. The survey covered workplaces in an area defined by the set of 88 planning analysis zones selected to represent workplaces which are readily accessible by BART. The zones include the destinations of virtually all work trips made on BART.*

Final Report of the ITD Project

This report is the final report of the Implications for the Transportation Disadvantaged Project. The purposes of this report are to:

- summarize the key findings of the project's investigation of BART's impacts on the transportation disadvantaged in each of the four major areas of issue evaluation conducted in the ITD Project.
- identify and discuss the principal implications of the BART experience for the transportation disadvantaged as they relate to the effectiveness of BART in fulfilling various transportation and other planning objectives, and as they relate to local, state and federal policy issues.

The report is organized by these objectives. In Chapter II, the key demographic characteristics of the transportation disadvantaged population of the San Francisco Bay Area are discussed in terms of the incidence of BART's potential impacts on these groups. In Chapter III, the empirical findings and conclusions of the impact issue investigation study of the ITD Project are summarized. The overall implications for the transportation disadvantaged of these findings regarding BART's impacts to date are then reported in Chapter IV.

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* Management Information Associates. Metropolitan Transportation Commission Workplace Survey: Procedures Followed. BART Impact Program. Metropolitan Transportation Commission, Berkeley. October, 1977.

II. DEMOGRAPHIC CHARACTERISTICS OF THE SAN FRANCISCO BAY AREA TRANSPORTATION DISADVANTAGED POPULATION

In order to evaluate BART's impacts on ethnic minorities, the elderly and the handicapped, it is necessary to identify certain key population related impact determinants for these groups. The most important of these are:

- Population Size, Change and Location, and
- Employment and Income Characteristics.

These demographic characteristics are major factors shaping the nature and extent of the environmental, mobility, economic and land use impacts of BART for the transportation disadvantaged.

Sources of Information

The primary source of data which permits analysis of the population characteristics of the Bay Area disadvantaged is the 1970 U.S. Census of Population and Housing. The fact that this source of population data was enumerated eight years ago in the pre-BART period, gives reason for some concern in the estimation of specific BART population related impacts. Checks of the accuracy and currency of the census data were conducted within the Environment Project. It is the conclusion of this work that the 1970 U.S. Census provides a useful data base for BART impact evaluation and that there appear to have been no gross changes in residential population characteristics which invalidate the 1970 data in representing present day conditions.

Sources of population data based on 1970 U.S. Census enumeration used in the ITD Project have included:

- Bureau of the Census Publications,
- Transportation System and Travel Behavior Project (BIP),
- Environment Project (BIP),
- Phase I: ITD Project (BIP),
- The Minority Transportation Needs Assessment Project (MTNAP), and
- Environmental Impact Appraisal Process (MTC).

Population data regarding the size and distribution of the transportation disadvantaged population of the Bay Area are available for several different geographic units relevant to different considerations about BART's impacts. These may be listed in declining order of population size and briefly defined:

- Greater BART Service Area (GBS) The 239-zone* area of San Francisco, Alameda, Contra Costa and northern San Mateo (96% of all BART trip origins).
- Bay Area Rapid Transit District (BARTD) Three County Area of San Francisco, Alameda and Contra Costa.
- Primary BART Service Area (PBS) The 132-zone subarea of GBS representing a more immediate "catchment" area (80% of all BART trip origins).
- BART Impact Corridor Area comprised of Census tracts within 1/4 mile of BART lines and stations.
- BART Station Areas Immediate area surrounding BART stations (either 1/4 or 1/2 mile radius depending on nature of the analysis).

The Ethnic Minority Population

Size, Growth Trends and Locational Distribution

Table II-1 shows the estimated resident population by principal ethnic minority group for each of the principal geographic units of analysis. These data are based on 1970

*The Metropolitan Transportation Commission has established a set of 440 aerial zones of analysis for transportation and general planning purposes in the nine-county Bay Area.

Table II-1

SUMMARY POPULATION STATISTICS FOR ETHNIC MINORITIES
BY PRINCIPAL GEOGRAPHIC ANALYSIS AREAS
(1970 U. S. Census)

Geographic Area	Blacks Number Percent	Spanish- Heritage Number Percent	Other Minority ^d Number Percent	Total Minority Number Percent	Total Population
Greater BART Service Area ^a	303,000 11.8%	326,000 12.7%	190,000 7.4%	819,000 31.9%	2,565,000
BART District ^a (3 counties)	298,980 12.7	288,827 12.3	179,100 7.6	776,907 33.1	2,347,000
San Francisco	96,078 13.4	101,897 14.2	108,800 15.2	306,775 42.9	715,674
Alameda	161,282 15.0	135,027 12.6	55,800 5.2	352,109 32.8	1,073,184
Contra Costa	41,620 7.5	51,903 9.3	14,500 2.6	108,023 19.3	558,389
Primary BART Service Area ^a	232,000 14.3	220,000 13.6	120,000 7.4	572,000 35.3	1,620,000
BART Impact Corridor ^b	151,600 20.4	117,900 15.8	N/A --	N/A --	744,900
Station Areas ^c (within 1/2 mile)	59,700 16.3	60,800 16.6	49,300 13.5	167,800 45.9	365,700

^a PMM & Co. BART's First Five Years: Transportation and Travel Impacts. BART Impact Program. (Draft Final Report). Metropolitan Transportation Commission, Berkeley, December, 1977.

^b DeLeuw, Cather & Company. A Description of BART: Its Facilities, Service and Surroundings. BART Impact Program. Document No. DOT-BIP-WP 44-4-77. Metropolitan Transportation Commission, Berkeley, December, 1977.

^c McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

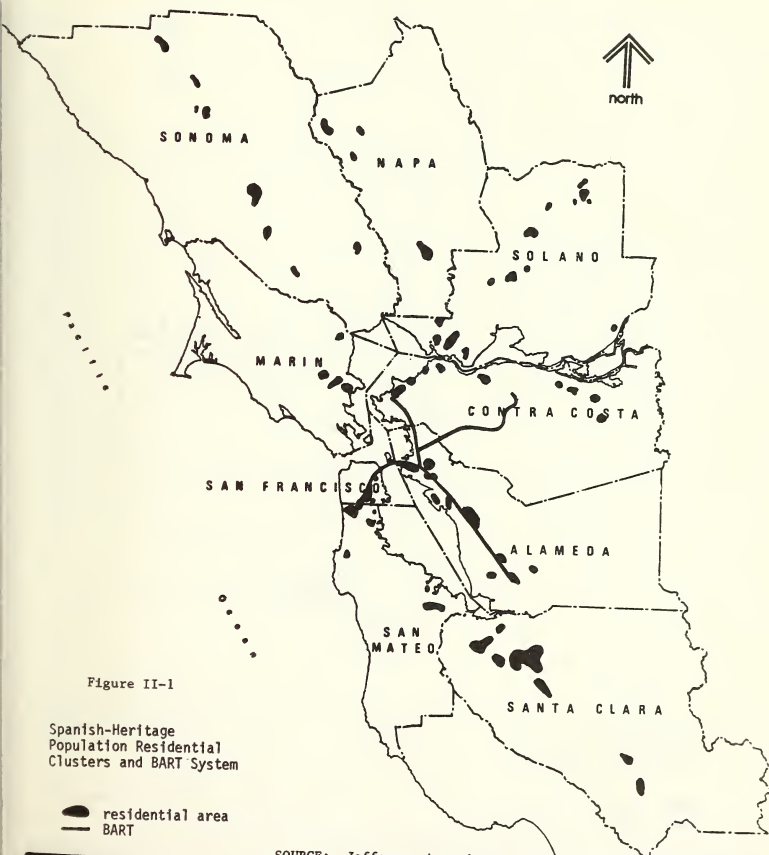
^d Predominantly Asian (Chinese, Japanese and Filipino).

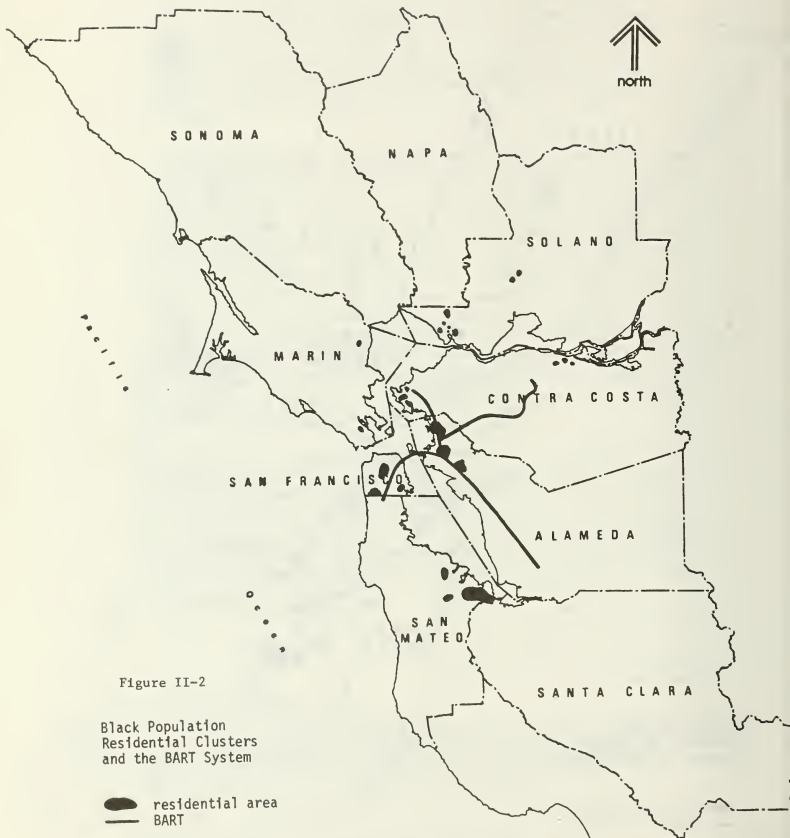
U.S. Census of Population and Housing counts. The table illustrates a pattern of generally increasing proportion of ethnic minorities as percent of the total resident population of each geographic area as they are delineated in increasing refinement with respect to the BART system. While ethnic minorities constitute 31.9 percent of the Greater BART Service Area, they constitute 35.3 percent of the Primary BART Service Area, and 45.9 percent of the population living within one-half mile of the thirty-four BART stations.

As part of a special study of the Metropolitan Transportation Commission, the residential clusters of principal ethnic minority groups have been mapped for the nine-county Bay Area region.* The geographic distribution of the Spanish-heritage, Black, and Asian populations shown in Figures II-1, II-2, and II-3, respectively, indicate a general pattern of 1) proximity to the BART system and 2) greatest population concentrations in the more central subareas of the region. These geographic distributional characteristics of the minority population suggest that due to the location of BART, the ethnic minority population could be expected to be substantially affected, and perhaps more than the general population, by many of BART's impacts — environmental, mobility, economic and land use.

Table II-2 lists each of the thirty-four BART stations and shows the size of the total population living within one-half mile of each BART station, percentage of each major minority group, and estimated median income. These figures provide the best indicator available of the detailed population characteristics of the immediate area around BART stations. The total population residing within one-quarter mile of each station is also shown.

* Jefferson Associates, Inc. Minority Transportation Needs Assessment Project: Phase I Report. BART Impact Program. Metropolitan Transportation Commission, Berkeley. November, 1977.





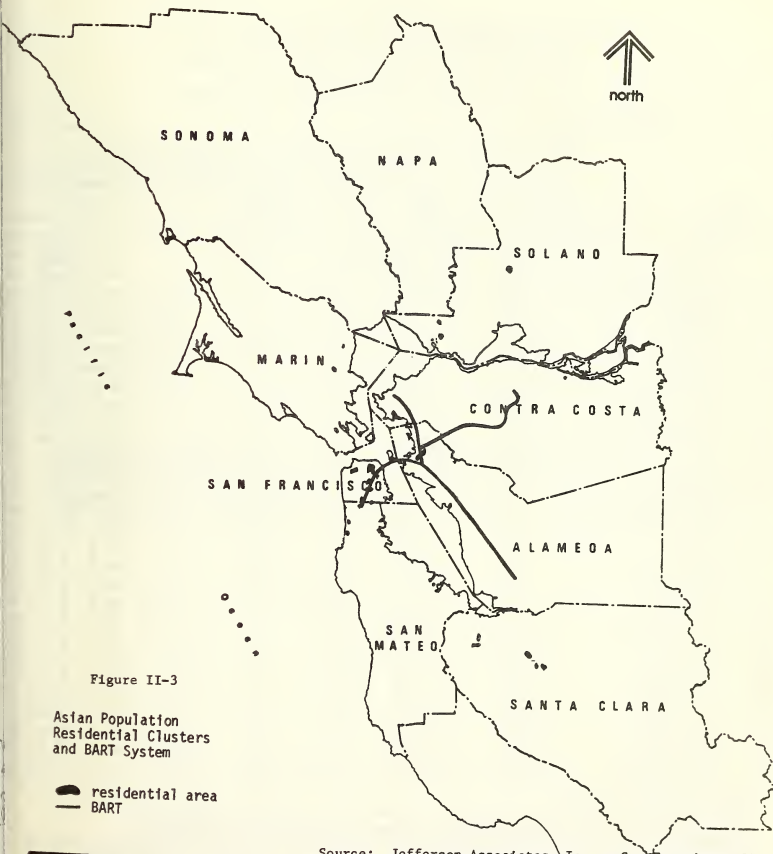


Figure II-3

Asian Population
Residential Clusters
and BART System

— residential area
— BART

Source: Jefferson Associates, Inc. - San Francisco, CA.,
Minority Transportation Needs Assessment Project

Table II-2
SELECTED CHARACTERISTICS OF THE POPULATION
1970 CENSUS DATA FOR BART STATIONS

* Station Areas of High Ethnic Minority Concentration (+40%)
O Downtown Stations

BART Station	Total Population within One-Quarter Mile ^a	Population Within One-Half Mile Radius ^b					
		Total Population	Percent Black	Percent Spanish Heritage	Percent Other	Percent of Total Minority	Income
1. Concord	997	5,650	0.0	7.0	2.2	9.2	\$11,215
2. Pleasant Hill	785	3,166	0.2	7.0	2.6	9.8	13,346
3. Walnut Creek	763	3,600	0.3	6.4	1.8	8.5	10,744
4. Lafayette	727	--	0.3	3.5	1.2	5.0	16,400
5. Orinda	298	--	0.0	3.2	0.5	3.7	21,474
6. Rockridge	2,381	9,237	16.0	4.2	3.2	23.4	8,023
* 7. Richmond	1,756	8,914	27.6	16.4	1.6	45.6	8,041
8. Del Norte	936	5,585	15.8	7.2	8.6	31.6	13,272
9. El Cerrito Plaza	1,607	9,250	2.4	7.8	5.3	15.5	15,176
*10. North Berkeley	2,533	11,553	25.7	8.2	14.3	48.2	9,398
O 11. Berkeley	3,795	20,813	7.0	4.8	10.0	21.8	7,187
*12. Ashby	3,116	20,215	59.1	4.2	3.4	66.7	7,756
13. Fremont	0	2,039	0.0	15.0	2.0	17.0	11,167
*14. Union City	0	--	0.0	86.0	2.0	88.0	8,400
15. South Hayward	1,763	1,519	0.2	21.7	2.7	24.6	9,562
*16. Hayward	756	4,565	0.2	36.3	2.7	39.2	9,175
17. Bayfair	1,283	7,883	0.1	18.5	2.8	21.4	10,710
18. San Leandro	903	5,976	0.0	23.3	2.2	25.5	10,320
*19. Coliseum	675	6,548	82.7	9.5	3.2	95.4	5,707
*20. Fruitvale	1,856	8,624	18.9	37.2	6.8	62.9	7,108
*21. Lake Merritt	2,042	5,158	10.5	4.9	33.7	49.1	7,965
*22. MacArthur	2,361	11,027	63.7	8.9	4.7	77.3	9,265
O 23. 19th Street	1,795	9,441	22.4	7.0	5.6	35.0	7,626
O 24. 12th Street	1,115	7,921	25.2	9.7	16.8	51.7	7,334
*25. W. Oakland	2,240	6,295	89.4	5.0	1.6	96.0	4,711
*26. Daly City	2,219	10,417	25.5	19.0	8.7	53.2	10,373
*27. Balboa Park	1,898	14,686	11.8	20.5	8.8	41.1	10,952
*28. Glen Park	3,574	13,851	5.0	26.3	12.2	43.5	11,186
*29. Mission-24th	8,542	32,050	3.0	41.4	10.2	54.6	8,070

(continued on next page)

^a Census blocks within one-quarter mile of BART station. Source: DeLeuw, Cather & Co. Worksheets for BART Impact Population within One-Quarter Mile of Stations.

^b Portions of census tracts within one-half mile of BART station. Source: McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-SIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

Table II-2 (continued)

**SELECTED CHARACTERISTICS OF THE POPULATION
1970 CENSUS DATA FOR BART STATIONS**

*Station Areas of High Ethnic Minority Concentration (+40%)
 O Downtown Stations

BART Station	Total Pop- ulation within One- Quarter Mile ^a	Population Within One-Half Mile Radius ^b					
		Total Population	Per- cent Black	Percent Spanish Heritage	Per- cent Other	Percent of Total Minority	Income
* 30. Mission-16th	8,481	31,341	7.3	37.6	14.7	59.6	\$7,282
O 31. Civic Center	4,559	30,816	10.8	11.3	11.7	33.8	6,306
O 32. Powell Street	3,666	21,829	3.7	8.9	15.9	28.5	7,450
⊙ 33. Montgomery St.	402	25,919	1.7	5.3	50.2	57.2	7,416
⊙ 34. Embarcadero	621	11,795	1.8	4.9	50.0	56.7	9,387

^a Census blocks within one-quarter mile of BART station. Source: DeLeuw, Cather & Co. Worksheets for BART Impact Population within One-Quarter Mile of Stations.

^b Portions of census tracts within one-half mile of BART station. Source: McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

Of the three major ethnic groups considered in this analysis, Blacks are the largest of these groups in the following station areas: West Oakland, Coliseum, MacArthur, Ashby, Richmond, North Berkeley and Daly City. The Spanish-heritage form the largest of the three minority groups in Union City, Mission-24th Street, Mission-16th Street, Fruitvale, Glen Park and Balboa Park, while the "other" category which includes Asians forms the largest population group in the Montgomery Street, Embarcadero and Lake Merritt station areas.

As part of the ITD analysis, it was necessary to select some classification criterion to differentiate those station areas with "high" from those with "low" ethnic minority concentrations in the surrounding area. Ethnic minorities constitute approximately one-third (32%) of the three county BART area. The ITD Project has utilized a total ethnic minority concentration criterion of forty percent (40%) or more to classify a BART station area as having a high concentration of ethnic minorities. The Hayward station is also included in the high ethnic concentration category due to the high concentration of one ethnic minority (36.3% Spanish-heritage). Based on this classification scheme, eighteen (18) of the thirty-four (34) BART stations can be considered to be located in areas of high total ethnic minority concentration. Three of these are downtown stations.

No comprehensive population data exist to document the changes which have occurred in the distribution of each of the ethnic groups of the Bay Area's population since 1970 or since the beginning of BART's operation. Table II-3 illustrates the key demographic trends which were experienced in the pre-BART period between 1960 and 1970 in the region. These trends reflect the interaction of differential fertility, in-migration, out-migration and intra-regional migration rates among the ethnic groups of the area. The most important trends may be summarized:

- increasing regional population, with slight decrease in total central city area population, and relatively rapid suburban population growth;

Table II-3

CHANGE IN POPULATION ETHNIC COMPOSITION: 1960-1970 FOR
CENTRAL AREA AND OTHER PARTS OF FOUR COUNTY BART AREA
(Percent Ethnic Group as Share of Place Population)

Ethnic Category (Race)	San Francisco		Oakland		Balance of Area		Four County BART Area ^a	
	1960	1970	1960	1970	1960	1970	1960	1970
White ^b	81.6%	71.4%	73.6%	59.1%	93.4%	90.5%	87.0%	81.9%
Black	10.0	13.4	22.7	34.5	3.9	5.7	8.5	11.2
Asian	7.9	13.6	3.2	4.8	1.7	2.6	3.8	5.3
Other	0.4	1.5	0.5	1.6	0.9	0.9	0.7	1.1
All Persons	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%
Percent Change 1960 to 1970	740,316	715,674	367,568	361,561	1,394,058	1,826,246	2,501,942	2,903,481
	--	-3.3%	--	-1.6%	--	+31.0%	--	+16.0%

^a San Francisco, Alameda, Contra Costa and San Mateo County.

^b Includes Spanish-heritage persons.

Comparable U.S. Census data for 1960 and 1970 does not exist.

Source: Urban Dynamics Associates. 1960 and 1970 U.S. Census of Population and Housing.

- greatest total regional population growth among ethnic minority groups;
- relatively rapidly increasing concentration of ethnic minorities in the central city areas with declining White population; and
- slower, but increasing proportion of ethnic minorities in non-central city, predominantly White areas.

Based on the analysis of the "Annual Housing Survey: 1975", it appears that these regional population trends have continued since 1970.* Table II-4 shows that the number of White occupied central city housing units declined substantially between 1970 and 1975 with a loss of 38,100 units (-11.9%). The number of Black and "Other Minority" central city households has increased during the period with an additional 15,500 (+25.3%) and 10,400 (+26.9%) units, respectively. In non-central city areas of the San Francisco-Oakland SMSA, the minority population growth rate appears to be greater than that of the White population; however, Whites continue to capture the greatest share of growth in these predominantly White non-central city areas (76.3% of the total 96,900 additional housing units).

Employment and Income Characteristics

While all members of ethnic minority groups cannot be considered "disadvantaged", the effects of past and present discrimination is evident in the analysis of income levels for ethnic minorities as a group. Table II-5 shows income levels for the Black and Spanish-heritage population of the Bay Area are substantially below those of other residents of the region. According to the 1970 U.S. Census, 41.5 percent of the BART District population had household incomes less

* Bureau of the Census, U.S. Department of Commerce and U.S. Department of Housing and Urban Development. General Housing Characteristics: Annual Housing Survey, 1975. Current Housing Reports, Series H-150-75A. April, 1977.

Table II-4

ANALYSIS OF CHANGE IN HOUSING INVENTORY BY
ETHNIC CATEGORY OF OCCUPANT: 1970-1975
(San Francisco-Oakland SMSA)*

	Central Cities San Francisco and Oakland			Not in Central Cities			TOTAL SMSA		
	Share 1970	Share 1975	Growth 70-75	Share 1970	Share 1975	Growth 70-75	Share 1970	Share 1975	Growth 70-75
White	74.5%	67.6%	+11.9%	92.5%	90.3%	+12.3%	85.2%	82.1%	+3.7%
Black	16.6	20.8	+21.5	4.8	5.3	+25.3	9.6	10.9	+22.7
Other Minority	8.9	11.6	+26.9	2.7	4.4	+86.3	5.2	7.0	46.8
Total Occupied All Year Round Housing Units:	434,000	421,300	-12,700	651,500	748,400	+96,500	1,085,500	1,169,700	+84,200
Percent	100.0%	100.0%	-2.9%	100.0%	100.0%	+14.9%	100.0%	100.0%	+7.8%

*San Francisco-Oakland SMSA: Five Counties of San Francisco, Alameda, Contra Costa, San Mateo, and Marin.
Source: Urban Dynamics Associates. U.S. Bureau of Census; Annual Housing Survey: 1975 Housing Characteristics for Selected Metropolitan Areas. San Francisco-Oakland, California, Standard Metropolitan Statistical Area (SMSA).

Table II-5

1970 HOUSEHOLD INCOME DISTRIBUTION BY ETHNICITY:
THREE COUNTY BART SERVICE AREA

	Black	Spanish- heritage	Others ^a	Total
Under \$5,000	30.2%	17.4%	12.7%	15.3%
\$ 5,000 to \$ 6,999	13.7	10.6	7.9	8.9
\$ 7,000 to \$ 9,999	<u>20.0</u>	<u>21.6</u>	<u>16.3</u>	<u>17.3</u>
Sub-total (Below \$10,000)	63.9%	49.6%	36.9%	41.5%
\$10,000 to \$14,999	22.8%	29.8%	30.0%	29.1%
\$15,000 to \$24,999	11.7	17.3	25.2	22.7
\$25,000 and over	<u>1.5</u>	<u>3.3</u>	<u>7.9</u>	<u>6.6</u>
	100.0%	100.0%	100.0%	100.0%

^a Number of all families in each income range minus number of Black and Spanish-heritage families in each. Includes Asians and other ethnic minorities, but is predominantly White.

Source: Urban Dynamics Associates. U.S. Census of Population: 1970. General Social and Economic Characteristics. Tables 124, 128 and 133.

than \$10,000 per year. Nearly two-thirds (63.9%) of the Black population and about one-half (49.6%) of the Spanish-heritage population had household incomes in this lower range. No income data are available from the Census for the Asian population of the three county area.

Correspondingly, employment opportunities are generally more limited for minorities. The level of minority employment in the areas of the BART District which are served by BART is of special interest for the ITD Project. Based on analysis of the BART Workplace Survey, Table II-6 indicates that in the total employment area served by BART, the rate of Asian employment is relatively higher, Black employment equivalent, and Spanish-heritage employment lower than their respective representation in the GBSA population. It is noteworthy that in the two central city downtown areas best served by BART (68.5% of all Workplace Survey BART trips), Spanish-heritage workers are underrepresented in Oakland CBD employment and Black workers underrepresented in San Francisco CBD employment.

Elderly and Handicapped Population

According to the 1970 Census, the elderly constituted eight percent (8.4%) of the total population residing within the three county BART District. As shown in Table II-7, there were 196,086 persons sixty-five years or older living in the three county area in 1970. It is estimated that approximately fifteen percent of the elderly suffer from some type of mobility impairing handicap.

In the area within one-quarter mile of the BART system, a somewhat higher percentage of elderly residents is found than in the general distribution throughout the three county area. As shown in Table II-7, the 82,256 elderly persons living in the BART Impact Corridor represent eleven percent (11%) of the total population within

Table II-6

RATE OF EMPLOYMENT BY ETHNIC CATEGORY
IN AREAS SERVED BY BART

Ethnic Category	Percent Population of Greater BART Service Area ^a (1970)	Percent Total Employment in BART Areas ^b		
		Total Workplace Area ^c	San Francisco CBD	Oakland CBD
White	68.1%	61.9%	55.2%	69.4%
Black	11.8	11.8	8.0	14.7
Spanish-heritage	12.7	9.4	8.5	4.1
Asian & Others	7.4	16.9	28.3	11.8
All Persons	100.0%	100.0%	100.0%	100.0%
Total Number Represented	2,347,000	505,977	177,688	61,135

^a Source: Peat, Marwick, Mitchell & Co. Demography of Areas Served By BART. BART Impact Program. (Working Note: Work Element IV-6). Metropolitan Transportation Commission, Berkeley. October, 1977.

^b Peat, Marwick, Mitchell & Co. Analysis of 1977 Workplace Survey. BART Impact Program. (Working Note). Metropolitan Transportation Commission, Berkeley. December, 1977.

^c Definition of Workplace Survey Area. See Page I-9.

Table II-7

BAY AREA ELDERLY SUMMARY
POPULATION STATISTICS
(1970 U.S. Census)

Area	Population over 64	Percent of Total Population	Total Population
3-County BART Area	196,086	8.4%	2,347,247
Alameda County	99,199	9.2	1,073,184
Contra Costa County	38,778	6.9	558,389
San Francisco County	58,109	8.1	715,674
BART LINES*			
Total BART System	82,256	11.0%	744,914
Fremont Corridor	29,347	10.7	274,014
Concord Corridor	14,272	10.1	140,750
Richmond Corridor	14,525	10.5	138,928
Daly City Corridor	24,112	12.7	190,502

* Includes census tracts within one-quarter mile of BART.

Source: DeLeuw, Cather & Co. A Description of BART: Its Facilities, Service and Surroundings. BART Impact Program. Document No. DOT-BIP-WP 44-4-77. Metropolitan Transportation Commission, Berkeley. December, 1977.

the corridor. Approximately forty-two percent (42%) of the three county area's elderly population live in this corridor as compared to thirty-one percent (31%) for the non-elderly population.

There is considerable variation in the concentrations of elderly around station areas. In general, the highest concentrations of elderly occur in downtown Oakland and San Francisco and adjacent areas. The lowest concentrations of elderly occur in suburban locations. Four of the eight station areas with more than 15 percent elderly also contain high concentrations of ethnic minorities (greater than 40 percent). BART station areas in Orinda, Fremont, Pleasant Hill and South Hayward have the lowest concentrations of elderly.

Table II-8 provides a summary table of all thirty-four BART station areas. The classification of the station area is shown; whether high or low, ethnic or elderly concentration. Stations are also grouped by area type — downtown, urban residential and suburban. Within each group, stations are listed in descending rank order for total population size within an area one-quarter mile from the station (density). All of the stations with high concentrations of either ethnic minorities or elderly are located in downtown or urban residential areas, with the exception of Union City (no population in immediate station area). Half of the high concentration elderly stations are located in downtown areas. Four station areas have high concentrations of both elderly and ethnic minorities: Civic Center, Mission-16th Street, MacArthur and Lake Merritt.

Figure II-4 provides a map of the BART system and indicates station areas with high concentrations of ethnic minorities (greater than 40%) and station areas with high concentrations of elderly (greater than 15%). All of the San Francisco and Oakland station areas are populated with high concentrations of ethnic minorities and/or the elderly. The North Berkeley, Union City, Richmond, Hayward and the Daly City station areas are also populated with high concentrations of ethnic minorities.

Table II-8

BART STATION AREAS:
COMPOSITE ETHNIC AND ELDERLY PROFILE

Station	Total Pop. ^a (1/4 mile)	Concentration of Ethnic Minorities ^b		Concentration of Elderly ^c	
		High	Low	High	Low
DOWNTOWN (7)					
Civic Center	4559		x	x	
Berkeley	3795		x		x
Powell	3666		x	x	
12th Street	1795	x		x	
19th Street	1115		x	x	
Embarcadero	621	x			x
Montgomery St.	402	x			x
URBAN RESIDENTIAL (17)					
Mission-24th Street	8542	x			x
Mission-16th Street	8481	x		x	
Glen Park	3574	x			x
Ashby	3116	x			x
North Berkeley	2533	x			x
Rockridge	2381		x	x	
MacArthur	2361	x		x	
West Oakland	2240	x			x
Daly City	2219	x			x
Lake Merritt	2042	x		x	
Balboa Park	1898	x			x
Fruitvale	1856	x			x
Richmond	1756	x			x
El Cerrito Plaza	1607		x		x
El Cerrito del Norte	936		x		x
San Leandro	904		x		x
Coliseum	675	x			x

(continued on next page)

^a Source: DeLeuw, Cather & Co. "Population Within One-Quarter Mile of Stations." (Worksheets).

^b From Table II-2. High Concentration, total ethnic minority more than 40% of population within one-half mile of station.

^c From DeLeuw, Cather & Co. "Population Within One-Quarter Mile of Stations." (Worksheets). High Concentration, more than 15% elderly within one-quarter mile of station.

Table II-8 (continued)

BART STATION AREAS:
COMPOSITE ETHNIC AND ELDERLY PROFILE

Station	Total Pop. ^a (1/4 mile)	Concentration of Ethnic Minorities ^b		Concentration of Elderly ^c	
		High	Low	High	Low
SUBURBAN (10)					
South Hayward	1763		x		x
Bay Fair	1283		x		x
Concord	997		x		x
Pleasant Hill	785		x		x
Walnut Creek	763		x		x
Hayward	756	x			x
Lafayette	727		x		x
Orinda	298		x		x
Union City	0	x			x
Fremont	0		x		x

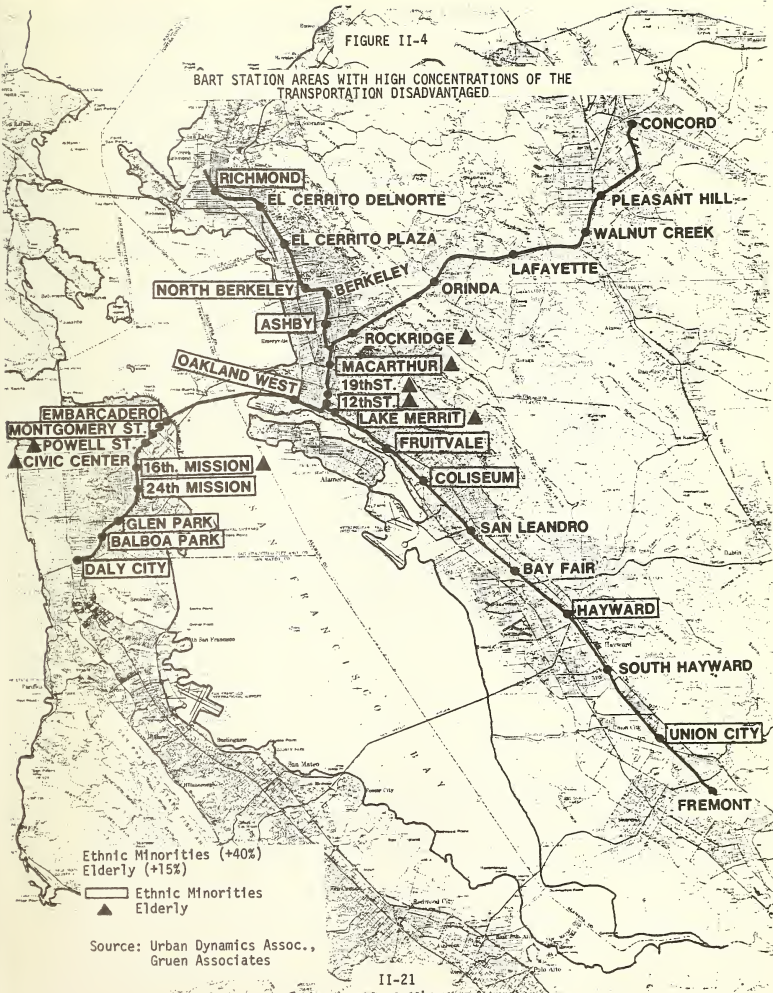
^a Source: DeLeuw, Cather & Co. "Population Within One-Quarter Mile of Stations." (Worksheets).

^b From Table II-2. High Concentration, total ethnic minority more than 40% of population within one-half mile of station.

^c From DeLeuw, Cather & Co. "Population Within One-Quarter Mile of Stations." (Worksheets). High Concentration, more than 15% elderly within one-quarter mile of station.

FIGURE II-4

BART STATION AREAS WITH HIGH CONCENTRATIONS OF THE
TRANSPORTATION DISADVANTAGED



III. IMPACT ISSUE INVESTIGATION FINDINGS

Four major areas of BART's potential impacts on the transportation disadvantaged have been studied in the ITD Project. These have included: environmental impacts; mobility and accessibility impacts; economic, employment and financial impacts; and land use and urban development impacts. This chapter briefly summarizes the results of the investigation of the specific impact issues included in each sub-area of the ITD study. The conclusions and implications of these findings are discussed in Chapter IV.

Environmental Impacts on the Transportation Disadvantaged

Six issues relating to possible environmental impacts of the BART system on the transportation disadvantaged have been investigated. Information developed in the various project areas of the BART Impact Program were applied in the evaluation of each issue. A brief summary of the findings of Work Element 3.1: Environmental Issues follows.*

ISSUE NUMBER 1-1: "Has BART significantly reduced the quality of life in ethnic minority residential neighborhoods around the stations by creating parking problems, increasing automobile congestion, or increasing traffic safety hazards?"

The principal negative environmental impact caused by BART's operation is induced commuter auto traffic and associated parking problems within station areas. The extent of traffic related problems around a particular station is a function of both the level of auto access by BART riders to and from that station and the station area's physical and social environment.

*All BIP document sources used in Work Element 3.1 are referenced in the Technical Memorandum: Urban Dynamics Associates. The Implications of BART's Environmental Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 34-10-78. Metropolitan Transportation Commission, Berkeley. January, 1978.

Table III-1 shows that the rate of auto mode access to BART is substantially higher in station areas of low ethnic minority concentration (68 percent) as compared to the rate of auto access in station areas of ethnic minority concentration (48 percent). Correspondingly, most of the auto-related environmental impacts are occurring in these areas.

However, on-street parking by BART users is a problem in a number of minority areas. BART has provided off-street parking facilities at all twelve of the non-downtown stations located in areas of low ethnic minority concentration with a total capacity for 12,260 vehicles.* Off-street parking is provided at eleven of the fifteen stations located in areas of high ethnic minority concentration with a total number of 7,868 spaces. Table III-2 shows the lot capacity and estimated overflow parking impact at each of the twelve stations which are filled to capacity daily by BART commuters. Five station areas are experiencing substantial parking overflow onto adjoining area streets. Two station areas where no BART provided off-street parking exists are also experiencing substantial BART-related parking impacts. Five of these seven station areas are located in areas of high total ethnic minority concentration.

Auto access impacts of BART can be expected to increase in the future with growing BART ridership, unless additional parking capacity is provided at stations with on-street parking problems such as recently done at the Daly City station. Alternatively, improved feeder bus service and/or changes in BART parking policy might reduce levels of station auto access use. Also, community support for neighborhood permit parking programs may lead to preferential parking regulations which restrict BART related off-street parking in areas where overflow parking is a serious problem. This has occurred in the Daly City station area along with the construction of additional off-street BART parking facilities.

* BART parking lot capacities as of October, 1977.

Table III-1
INDICATORS OF AUTO TRAFFIC IMPACTS
IN STATION AREAS

Stations With
High Concentrations of Ethnic Minorities^a

Station	1 Entering First Leg of Trip ^b	Auto Access Mode			5 Index of Auto Use by BART Riders in Station Area ^d
		2 Percent Drive Alone	3 Percent Carpool ^c	4 Percent Dropped off	
Richmond	811	27.9	2.6	16.5	381
North Berkeley	1,013	30.2	1.4	9.2	413
Ashby	752	20.9	2.6	9.7	250
Union City	1,455	56.1	3.8	12.6	1,055
Coliseum	880	34.1	1.7	13.8	436
Fruitvale	1,433	42.2	2.2	11.9	807
Lake Merritt	1,078	28.2	2.8	17.9	527
MacArthur	1,033	37.6	2.6	13.1	551
Oakland West	945	59.1	5.3	14.9	749
Daly City	4,615	21.8	3.3	27.3	2,418
Balboa Park	2,325	25.3	3.4	23.1	1,204
Glen Park	2,654	22.8	2.3	21.5	1,237
Mission-24th St.	1,533	2.6	1.1	5.9	147
Mission-16th St.	1,075	6.8	0.7	10.6	195
Hayward	1,604	45.3	3.0	15.6	1,025
Totals	23,206				11,395
Averages	1,547	30.7	2.6	14.9	760

(continued on next page)

^a Based on a classification of 40 percent total minority population of total 1970 population within one-half mile of BART station.

McGuire, Chester A. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

^b The number of BART travelers entering the BART station from 6:00 a. m. to 3:00 p. m. and from 7:00 p. m. to Midnight who are making the first leg of a round trip.

^c Percentage in table is half the number reported by the 1976 PPS. This number reflects an assumption of two persons per carpool.

^d Sum of columns 2, 3 and 4 times column 1.

Table III-1 (continued)

INDICATORS OF AUTO TRAFFIC IMPACTS
IN STATION AREASStations With
Low Concentrations of Ethnic Minorities

Station	1 Entering First Leg of Trip ^a	2 3 4 Auto Access Mode			5 Index of Auto Use by BART Riders in Station Area ^c
		Percent Drive Alone	Percent Carpool ^b	Percent Dropped off	
Concord	3,033	44.7	4.8	22.6	2,187
Pleasant Hill	1,755	45.4	4.1	22.1	1,257
Walnut Creek	2,090	46.3	4.7	18.1	1,444
Lafayette	1,355	53.9	5.8	20.9	1,092
Orinda	1,278	59.9	5.6	20.1	1,094
Rockridge	1,118	36.3	3.2	8.3	534
El Cerrito del Norte	1,358	48.2	5.2	11.1	876
El Cerrito Plaza	1,042	29.5	2.4	9.4	430
Fremont	2,019	50.7	6.2	12.3	1,397
South Hayward	1,094	45.3	3.3	22.9	782
Bay Fair	1,742	50.6	5.7	14.8	1,239
San Leandro	1,079	41.6	4.3	16.5	673
Totals	18,963				13,005
Averages	1,580	46.0	4.5	16.5	1,084

^a The number of BART travelers entering the BART station from 6:00 a. m. to 3:00 p. m. and from 7:00 p. m. to Midnight who are making the first leg of a round trip.

^b Percentage in table is half the number reported by the 1976 PPS. This number reflects an assumption of two persons per carpool.

^c Sum of columns 2, 3 and 4 times column 1.

Source: 1976 Passenger Profile Survey. Peat, Marwick, Mitchell & Co. BART Station Access Case Studies. BART Impact Program. (Working Note). Metropolitan Transportation Commission, Berkeley. April, 1977.

Table III-2

FULL PARKING LOTS AND ON-STREET
PARKING AT BART STATIONS

Station ^a	Parking Lot Capacity ^b	Estimated Number of Cars On Street ^c
<u>Areas of High Ethnic Minority Concentration</u>		
Daly City	675	625
Glen Park	No Parking Lot	725
Balboa Park	No Parking Lot	750
Oakland West	403	250
Lake Merritt	225	150
Union City	816	0-100 ^d
Hayward	861	0-100 ^d
<u>Areas of Low Ethnic Minority Concentration</u>		
Fremont	735	525
Concord	1,074	575
Pleasant Hill	1,414	0-100 ^d
Walnut Creek	1,156	0-100 ^d
Lafayette	982	0-100 ^d
Orinda	939	0-100 ^d
South Hayward	483	0-100 ^d

^a Includes only BART stations with parking lots filled daily.

^b As of November, 1976; a few additions in capacity have been made since.

^c As of May, 1976, based on BART Passenger Profile Survey and site inspection to nearest 25 cars.

^d Fewer than about 100; no indications of significant impact.

Source: Gruen Associates, Inc., DeLeuw, Cather & Co. Environmental Impacts of BART: Final Report. BART Impact Program. Document No. DOT-BIP-FR 7-4-77. Metropolitan Transportation Commission, Berkeley. August, 1977.

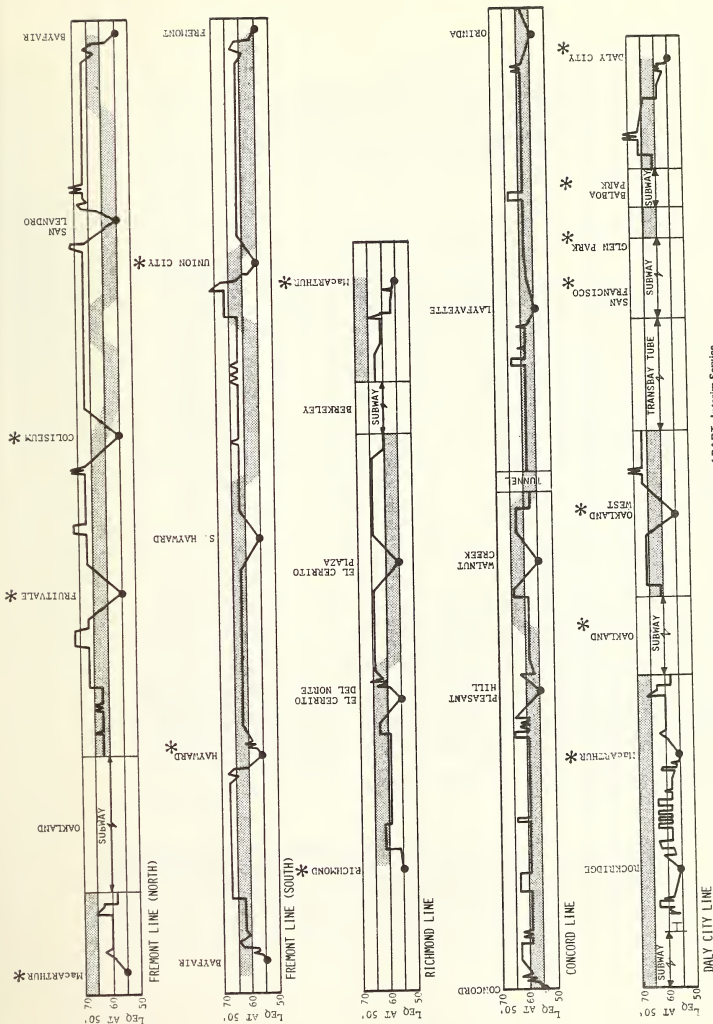
ISSUE NUMBER 1-2: "Has BART's environmental intrusion, e. g. noise, vibration, and loss of privacy, been an especially strong negative factor in ethnic minority areas?"

From comparisons of noise levels throughout the length of the seventy-one (71) mile BART system and the effects on selected population groups, those areas which are populated by high concentrations of ethnic minorities generally experience less impact from noise, vibration and loss of privacy, than non-minority station areas and line segments.

Figure III-1 indicates noise impacts of BART on adjacent communities. The patterned band depicts the range of mean community L_d in dB(A) at 50 feet from the track, while the heavy line indicates BART-generated noise at 50 feet.* Stations with large concentrations of ethnic minority residents are indicated with a large asterisk. It can be seen in this figure that BART noise levels in excess of local background levels are generally less frequent in these areas than in majority White suburban areas.

As shown in Table III-3, there has been an extensive use of subway sections in the urban areas of San Francisco, Oakland and Berkeley where minorities live in the greatest concentrations. This has resulted in virtually no noise impacts from BART's operation along these line segments. Also, where the most noisy aerial segments exist, they have frequently been located adjacent to or within the right-of-way of existing transportation facilities — railroad lines, freeways or major arterial roads. The ambient noise levels around these facilities are generally higher than those generated by BART.

*A dB(A) is a unit of sound intensity that weights the sound spectrum in a manner which gives special emphasis to sound that falls with the range of normal human hearing.



Source: Bolt Beranek & Newman, Inc., Acoustic Impacts of BART: Interim Service Findings, Document No. DOT-BIP-TM 16-4-76, Berkeley: Metropolitan Transportation Commission, March 1976.

FIGURE III-1
BART AND COMMUNITY NOISE LEVELS

Station Areas of High Ethnic Minority Concentrations

Table III-3

BART CONFIGURATION BY STATION LINK:
NON-DOWNTOWN AREAS OF LOW AND HIGH
ETHNIC MINORITY CONCENTRATIONS
(Distance in Feet^a)

BART Configuration	High Concentration Minority Areas ^b	Low Concentration Minority Areas	All Non-Downtown Areas
Aerial	60,800 (40.9%)	61,200 (34.3%)	122,000 (37.3%)
Surface	49,000 (32.9%)	114,200 (64.1%)	163,200 (49.9%)
Subway ^c	39,000 (26.2%)	2,800 (1.6%)	41,800 (12.8%)
Total BART System (Non-Downtown Areas)	148,800 (100.0%)	178,200 (100.0%)	327,000 (100.0%)

^a Where a high ethnic concentration station area adjoined one with a low ethnic concentration, one-half of the line segment between them was assigned to each station category.

^b Based on a classification of 40 percent total minority population of total 1970 population within one-half mile of BART station defining one end of line segment. McGuire, Chester A. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

^c Subsurface segments of the transbay tube and the Caldecott Tunnel omitted from totals.

Source: DeLeuw, Cather & Co. BART and Its Environment: Descriptive Data. BART Impact Program. (Working Note). Metropolitan Transportation Commission, Berkeley. March, 1976.

ISSUE NUMBER 1-3: "Do BART tracks constitute a barrier as they pass through ethnic minority communities?"

BART tracks are generally not a barrier as they pass through ethnic minority communities. The placement of BART adjacent to major roadways, within arterial medians or underground, reduces or eliminates the potential barrier effect of line segments. A substantial proportion of BART's tracks has been constructed as subway sections in urban areas where minorities live in the greatest concentrations. Also, as shown in Table III-4, only a small percentage of aerial and surface line segments have been located in new separate rights-of-way (1.6%) in areas of high ethnic minority concentration. Furthermore, BART divides differing and often incompatible, rather than similar, land uses. Where similar land uses are traversed, BART is located within a subway configuration, minimizing the long-term effect on activity patterns of the adjacent land uses. Where BART has been fenced, beneficial safety and security effects have resulted. Pedestrian traffic has been channeled over potentially dangerous railroad rights-of-way with pedestrian bridges.

BART overflow parking is generally perceived as a nuisance by a majority of residents in BART station areas where the problem exists. A substantial number of residents perceive overflow parking as a "barrier". This was found to be true in the Daly City station area.* Since population densities are greater in such areas with high concentrations of ethnic minorities, a larger population in these communities may be subject to parking impacts perceived as "barrier" effects.

ISSUE NUMBER 1-4: "Has personal security of BART users been a problem in minority areas, particularly during evening hours? Are there differences in the level of surveillance and protection provided in minority areas? Are there differences in the way minorities, the elderly and the handicapped perceive personal security?"

* The Daly City station area was the only one of the ten selected case study areas in the Environment Project's survey of the perception of BART's impacts on nearby residents which has both BART parking overflow problems and a high concentration of ethnic minority residents.

Table III-4

ADJACENT TRANSPORTATION FACILITIES IN MINORITY
AND NON-MINORITY RESIDENTIAL AREAS: AERIAL AND
SURFACE BART CONFIGURATION IN NON-DOWNTOWN
AREAS (Distance in Feet^a)

Configuration	High Concentration Minority Residential Areas ^b	Low Concentration Minority Residential Areas	All Non- Downtown Residential Areas
Separate Right-of-Way	1,400 (1.6%)	9,800 (7.1%)	11,200 (5.0%)
Next or Within Arterial	32,000 (36.9%)	23,800 (17.3%)	55,800 (24.9%)
Freeway	34,200 (27.8%)	42,400 (30.8%)	66,600 (29.7%)
Railroad	29,200 (33.6%)	61,600 (44.8%)	90,800 (40.5%)
Total Aerial & Surface Seg- ments	86,800 (100.0%)	137,600 (100.0%)	224,400 (100.0%)

^a One-half distance of line segment assigned to category of minority concentration classification of each station defining one end of line segment.

^b Based on a classification of 40 percent total minority population of total 1970 population within one-half mile of BART station defining one end of line segment. McGuire, Chester A. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

Source: DeLeuw, Cather & Co. BART and Its Environment: Descriptive Data. BART Impact Program. (Working Note). Metropolitan Transportation Commission, Berkeley. March, 1976.

The overall impact of BART on crime and personal security is minimal in areas of both high and low concentrations of ethnic minorities. As shown in Table III-5, initiation of evening service does not appear to have contributed to an increase in personal security problems within the BART system. There is no indication of differences in policy surveillance and protection between areas of low and high ethnic concentrations. Similarly, no evidence has been revealed which supports the hypothesis that there are differences in the way minorities, the elderly and the handicapped perceive personal safety as a factor related to BART.

ISSUE NUMBER 1-5: "Have BART construction activities caused greater disruption in ethnic minority communities over a more prolonged time period than in non-minority communities? Upon completion of BART on the other hand, are adverse long-term environmental effects less in minority than non-minority communities?"

Residential areas with high concentrations of ethnic minorities were subject to longer periods of construction affecting more people in locales which were more sensitive to disruptive effects (e.g., within street sections of community commercial areas). As shown in Table III-6, analysis of the length of contract periods for BART construction indicates that construction activities were extended over considerably longer periods of time in areas of high ethnic minority concentration.

Construction activity in downtown areas was even longer and more severe than in urban residential areas with high concentrations of ethnic minorities. In downtown San Francisco and Oakland, the elderly and ethnic minority residents were adversely affected by construction activities. The extensive use of subway sections and related downtown street improvement and beautification programs are the primary factors for long duration of construction activities in these areas. On the other hand, greater housing displacement was required in areas of low concentrations of ethnic minorities.

Table III-5

REPORTED SECURITY INCIDENTS IN AREAS OF
HIGH CONCENTRATIONS OF ETHNIC MINORITIES:
BEFORE AND AFTER EVENING SERVICE

Offense	1975 Before Evening Service				1976 After Evening Service			
	Sept.	Oct.	Nov.	Total	Sept.	Oct.	Nov.	Total
Aggravated Assault					1			1
Arson	1			1			3	3
Auto Theft	10	12	9	31	8	8	17	33
Battery	1	2	2	5	3	2		5
Burglary:								
Structure	2	2		4	2		3	5
Auto	36	26	21	83	15	14	23	52
Disorderly Conduct	2	1	3	6	2	3	4	9
Drunkenness	4	5	3	12	15	7	10	32
Grand Theft								
Pocket Picking					1			1
Purse Snatching								
Other		1		1	1	1		2
M/ M								
Narcotic drug laws	1	1		2	3	3	9	14
Petty theft	27	20	22	69	20	28	22	70
Robbery	1	2	2	5	5			5
Rock Throwing	3	2	2	7	1	1		2
Sex Offenses		1	1	2	1	1		2
Vandalism	22	15	13	50	9	13	14	36
Weapons		1	1	2	2			2
				280				274 (-2.1%)

Source: BART Police Services Department, "Report of Offenses and Miscellaneous Reports", 1975 and 1976.

Table III-6

CONSTRUCTION DURATION SUMMARY:
NON-DOWNTOWN AREAS

Months	High Concentrations of Ethnic Minority Residents (Number of Stations=15)	Low Concentrations of Ethnic Minority Residents (Number of Stations=12)
More than 22.3 ^a	11	5
More than 30.0	9	0
More than 40.0	8	0
More than 50.0	5	0
More than 60.0	1	0
More than 70.0	1	0

^a Mean average construction contract period for stations areas with low percentages of ethnic minorities.

Source: BART. "Summary of Construction Contracts."

ISSUE NUMBER 1-6: "Has BART improved the environmental quality of communities around stations with related street improvement projects, beautification programs, parks and landscaping, including passive and active recreational facilities?"

Bay Area residents have received some benefit from the street, landscaping and beautification projects coordinated with BART's construction. Pedestrian traffic in many BART station areas has been substantially enhanced. All population sectors in the Bay Area gained, to some extent, from these environmental projects and programs. The elderly and the handicapped have received benefits from the pedestrian orientation (curb cuts, signing, street furniture, etc.) of many of the projects, e.g. Market Street improvement project. Capital improvement amenities around stations generally reflect the character of the surrounding area, but have generally not stimulated significant community revitalization in the older, mixed land use areas where minorities live in the greatest concentrations. For example, streetscape improvements made in conjunction with station construction in the predominantly Spanish-heritage Mission District of San Francisco have been perceived as fairly localized and cosmetic amenities with only limited contribution to the overall physical environment of the area.

Mobility and Accessibility Impacts on the Transportation Disadvantaged

Five issues relating to the mobility and accessibility impacts of the BART system for the transportation disadvantaged have been investigated in the ITD Project. Information developed in the various project areas of the BART Impact Program has been applied in the evaluation of each issue. A brief summary of the findings of Work Element 3.2: Mobility Issues follows.*

*All BIP document sources used in Work Element 3.2 are referenced in the Technical Memorandum: Urban Dynamics Associates. The Implications of BART's Mobility and Accessibility Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 35-10-78. Metropolitan Transportation Commission, Berkeley. April, 1978.

ISSUE NUMBER 2-1: "Has BART improved accessibility to employment opportunities for the transportation disadvantaged?"

Comparison of average transit travel times provided in the With-BART transit network with those of the No-BART Alternative indicates that BART's overall impact on accessibility to employment centers in the Bay Area has been relatively modest for the region as a whole.* Analysis of BART's impact on transit travel times to a set of 50 zones representing the locations of the Bay Area's major employment opportunities, indicates that an average 5 minute travel time saving is associated with the addition of BART to the region's public transportation system, approximately a 12 percent savings. The most substantial improvements in transit travel time savings have been for commuters from outlying suburban residential areas to the downtown areas of San Francisco, Oakland and Berkeley. Correspondingly, various analyses of the Transportation System and Travel Behavior Project have shown that the greatest work accessibility benefits have accrued to Whites and upper income households. This non-disadvantaged group are both more likely to live in the outlying residential areas served by BART (see Table II-2, page II-8) and more likely to be employed in the CBD areas with highest access to BART than Black or Spanish-heritage persons (see Table II-6, page II-16). Table III-7 shows that BART-provided accessibility gains for residential areas have generally been the least within corridors where ethnic minorities live in the greatest concentrations. An important exception to this general conclusion is

* **With-BART Transit Network:** A representation of the entire 1976 transit system including BART, its bus feeder services, and all other bus and streetcar services in the area.

No-BART Transit Alternative (NBA): A representation of a hypothetical 1976 transit system, which has been selected by MTC for comparative analytic purposes and judged to be the most likely to have developed in the BART area if BART had not been built. It represents a transit system providing a much lower level of transit service than the With-BART network since it assumes that only minor improvements in the highly developed bus system existing in 1971, prior to BART, would have occurred if BART had not been built.

Table III-7

COMPARISON OF CORRIDOR TRANSIT ACCESSIBILITY TO 50
EMPLOYMENT ZONES WITH BART AND NO BART ALTERNATIVE:
PROPORTION OF ETHNIC MINORITY RESIDENTS

Origins: BART Corridor	Accessibility Improvement With-BART Rank Order ^a	Average Travel Times to Top 50 Employment Zones ^b , Minutes		Percent Corridor (PBSA) Population Non-White ^d	Percent Population Using BART ^d
		(Selected Origin Zone) ^c	With- BART Alt.		
Fremont	1	(203)	56.1	102.7	2.3%
Concord	2	(99)	49.0	60.3	4.5
Daly City	3	(363)	49.5	60.2	3.3
Richmond	4	(118)	41.1	42.7	2.9
Oakland	5	(138)	27.9	29.6	3.2%

^a Source: John Blayney Associates and David M. Dornbusch & Co., Inc. Accessibility Mapping. BART Impact Program. Document No. DOT-BIP-WP 36-5-77. Metropolitan Transportation Commission, Berkeley. September, 1977.

^b Source: Peat, Marwick, Mitchell & Co. Comparison of Travel Times From With-BART, No-BART, and Highway Networks. BART Impact Program. (Working Note: Work Element VI-2). Metropolitan Transportation Commission, Berkeley. October, 1977.

^c Average transit travel times from all origin zones in each corridor have not been tabulated in the TSTB Project. Selected zones shown in table are intended to illustrate level of accessibility gains provided by BART to employment centers from each corridor.

^d Source: Peat, Marwick, Mitchell & Co. Demography of Areas Served By BART. BART Impact Program. (Working Note: Work Element IV-6). Metropolitan Transportation Commission, Berkeley. October, 1977.

the substantial accessibility improvement provided to the Fremont Corridor containing a significant proportion of ethnic minority residents. However, transit travel times from this outlying corridor remain relatively high, which explains in part why the rate of BART use in the Corridor is the lowest of all the corridors.

Based on analysis of transbay travel, there is some indication that BART offers increased accessibility to East Bay job opportunities for ethnic minorities and low income persons living in San Francisco. However, industrial employment centers do not have a high degree of access to BART, either in terms of proximity or adequate bus-egress service. Consequently, BART has not yet provided a significant improvement in the accessibility to blue-collar employment for ethnic minority individuals or low-income households. Although BART has slightly improved job accessibility for the transportation disadvantaged, it constitutes a relatively minor factor in the overall nexus of social, political and economic factors which shape employment opportunities for this population subgroup.

Despite the fact that lower work accessibility gains have been achieved for ethnic minority employees with the introduction of BART, analysis of the Workplace Survey has shown that for those residents of the area for whom BART is a possible work travel alternative the rate of BART use as the principle mode of travel to and from work is somewhat higher among ethnic minorities than it is for the White majority. This reflects greater overall dependency on all forms of public transportation and suggests a shift in travel mode choice, not a major increase in work-related mobility for ethnic minorities.

ISSUE NUMBER 2-2: "Has BART provided ethnic minorities, handicapped and elderly with improved access to the area's social, medical, cultural and recreational facilities and events?"

Analysis of BART's impact on off-peak transit travel times indicates that BART has contributed slightly to greater accessibility for non-work related activities in the Bay Area for the general population, and to a lesser extent, for ethnic minorities. It is estimated that BART has provided a six minute

average travel time reduction for off-peak transit travel to the top 50 shopping zones of the region. Actual use of BART for non-work travel remains at a relatively low level compared to bus and streetcar, as well as the automobile.

Table III-8 shows the estimated share of area travel by major trip purposes carried by BART and other modes of travel during May, 1975. While relatively small, BART has had its principal non-work related activity impact on travel to and from educational institutions — 2.9 percent of total areawide school trips. Compared to the percentage of BART trips made by Whites which are school trips, a somewhat higher proportion of BART trips made by each of the three principal ethnic minority groups are to or from school, college or university (see Table III-13). Bus and streetcar transit carry an estimated 18.6 percent of school trips. BART's share of shopping trips is quite small — less than one percent of the area's total (0.6%). Access to medical care facilities has not been measurably affected by BART for either the majority population or the transportation disadvantaged. There are indications that a sizeable latent demand for recreational use of BART exists. With the implementation of weekend and full service levels, BART's impact on recreational travel could increase dramatically. A group discounted fare policy would be of particular benefit to the low income minority households in the use of BART for access to recreational, social and cultural activities.

ISSUE NUMBER 2-3: "What is the level and significance of BART use by ethnic minorities? Specifically, a) Are minority BART riders representative of the size and socio-economic composition of the service area minority population? b) Do minorities use the system less than one would expect? c) Are ridership rates from stations located in minority areas less than those located in non-minority areas? and d) What attributes of BART best explain the level of BART usage by minorities?"

Overall, BART's share of total weekday travel is by far the smallest of all travel modes in the Greater BART Service Area (GBSA*); about 2.4 percent compared to 10.6 percent on bus or streetcar, and 87.0 percent by automobile and other vehicle modes (see Table III-8). A comparison of BART ridership with the population aged 16 years of age or older in the GBSA indicates that total ethnic minority ridership on BART is slightly less (27.3%) than the proportion of the estimated 1975 ethnic minority population aged 16 years or older in the Greater BART Service Area (29.7%). The lower rate for total ethnic minority ridership is accounted for by a substantially lower rate of BART ridership by the Spanish-heritage population of the GBSA. As shown in Table III-9, Whites and Blacks use BART to an extent approximating their representation in the total GBSA population. The rate of BART ridership among the Asian population is significantly greater than the GBSA average.

Table III-10 reveals that in comparison to the area population in each ethnic category, Black riders of BART are generally higher-income than the Black population, White and Other riders are more representative, and Spanish-heritage riders are generally lower-income. An important finding of the ITD Project is that the lower-income Black population is substantially under-represented in BART's ridership.

Compared to White BART users, both Black and Spanish-heritage ridership distributions are characterized by lower incomes, are younger and consist of a larger proportion of women. These findings indicate a greater level of transit dependency among minority BART travelers than White riders. That ethnic minority BART users are more transit dependent is also reflected by the fact that while 39 percent of White BART users report bus or streetcar as their previous mode of travel, 56 percent of Black, 53 percent of Spanish-heritage and 48 percent of Asians switched from bus or streetcar to BART, as shown in Table III-11.

*The GBSA consists of the three Counties of San Francisco, Alameda, Contra Costa and the northern part of San Mateo County.

Table III-8

MODE AND PURPOSE OF TRAVEL

(Total Trips Made in Vehicles Monday through Friday, May 1975)

Trip Purpose	Mode of Travel			
	BART	Automobile Drivera	Automobile Passenger	Bus or Streetcar
Work	381,000 5.2%	4,779,000 65.6%	838,000 11.5%	1,291,000 17.7%
Business	33,000 1.9%	1,462,000 86.2%	108,000 6.4%	93,000 5.5%
School or College	77,000 2.9%	1,798,000 66.2%	325,000 12.3%	494,000 18.6%
Shopping	29,000 0.6%	3,788,000 78.5%	777,000 16.1%	230,000 4.8%
Other Purposes ^b	68,000 0.8%	5,926,000 72.1%	1,702,000 20.7%	521,000 6.4%
Number of Trips Represented	588,000 ^c	17,713,000	3,750,000	2,629,000
Percent of Trips Represented	2.4%	71.8%	15.2%	10.6%
Unweighted Sample Size	9,698	1,183	262	192

^a Includes "other" modes, largely pickup trucks and other commercial vehicles. A total of 834,000 weekday trips per week are made by these modes.

^b The other purposes category include recreation trips, trips to visit friends or relatives, and personal business trips.

^c Average number of weekday BART trips per week, May 1975.

Sources: BART Impact Program May 1975 Areawide Travel Survey. 1975 BART Passenger Profile Survey. Peat, Marwick, Mitchell & Co. Travel in the BART Service Area. BART Impact Program. Document No. DOT-BIP-WP 35-3-77. Metropolitan Transportation Commission, Berkeley. September, 1977.

Table III-9

RATE OF DAILY BART USE IN THE GREATER BART SERVICE AREA*
BY ETHNIC CATEGORY (DAILY BART TRIPS PER 100 POPULATION
16 YEARS OF AGE OR OVER)

Ethnic Category	Total Daily BART Trips ^a Percent Number	Estimated 1975 Population ^b Greater BART Service Area (16 years or older) Percent Number	Rate Per 100 Persons (16 years or older)
White	72.7%	96,000	7.25
Black	11.2	14,800	7.34
Spanish-heritage	5.9	7,800	3.63
Asians & Others	10.2	13,500	9.43
TOTAL	100.0%	132,000 ^c	7.00

* Greater BART Service Area (GBSA): San Francisco, Alameda, Contra Costa Counties and the northern portion of San Mateo County.

^a Source: Peat, Marwick, Mitchell & Co. Travel in the BART Service Area, Document No. DOT-BIP-WP 35-3-77. Passenger Profile Survey 1976. Weighted by Ethnic Category for differential response rates.

^b Source: Peat, Marwick, Mitchell & Co. Demography of Areas Served By BART, (Working Note: Work Element IV-6). October, 1977; and population estimates developed by staff of the Metropolitan Transportation Commission.

^c Estimated average BART daily ridership in May, 1976. Peat, Marwick, Mitchell & Co. BART Impacts on Highway Traffic and Transit Ridership, Document No. DOT-BIP-TM 20-3-76. May, 1977.

Table III-10

COMPARISON OF HOUSEHOLD INCOME DISTRIBUTION BY ETHNICITY:
THREE COUNTY BART SERVICE AREA POPULATION VERSUS BART USERS

	1975 Population Estimate ^a			BART Users - Daytime ^b		
	Black	Spanish	White & Other ^c	Black	Spanish	White & Other ^c
1. Under \$7,000	32.8%	17.8%	12.9%	20.2%	17.7%	15.2%
2. \$ 7,000 to \$ 9,999	15.2	11.2	8.3	19.0	21.1	10.0
3. \$10,000 to \$14,999	22.0	22.6	17.4	20.6	24.9	17.3
4. \$15,000 to \$24,999	27.3	33.5	36.7	24.8	26.7	31.7
5. Over \$25,000	2.7	14.9	24.7	15.3	9.5	25.8
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

^a Source: 1970 U.S. Census of Population; General Social and Economic Characteristics. Adjusted distribution to estimate 1975 family incomes using transition factors utilized in the Transportation System and Travel Behavior Project. Peat, Marwick, Mitchell & Co. Travel in the BART Service Area. Document Number WP 35-3-77. September, 1977. Appendix C.

^b Passenger Profile Survey 1976. File WX. Daytime Survey (6:00 AM to 3:00 PM). Crosstabs: Urban Dynamics Associates.

^c Other: Total persons minus Blacks and Spanish. Includes Asians, but is predominantly White.

Table III-11

SUMMARY OF BART TRIP CHARACTERISTICS
BY ETHNIC CATEGORIES

Trip Purposes By Ethnic Category
(Weighted Percentages of Total Daytime Travel By BART Riders)

Trip Purpose	White	Black	Spanish Heritage	Asian
Work	59%	62%	61%	57%
Business	4%	2%	2%	2%
School	10%	15%	12%	17%
Personal Business	12%	8%	13%	12%
Other	15%	13%	13%	12%
Percent of Trips Represented	72.7%	11.2%	5.9%	8.4%

Areas of Travel By Ethnic Category
(Weighted Percentages of Total Daytime Travel By BART Riders)

Travel Area	White	Black	Spanish Heritage	Asian
Within East Bay	33%	35%	30%	25%
Within West Bay	22%	27%	44%	36%
Transbay	45%	38%	26%	39%

Previous Travel Modes of BART Riders By Ethnic Category^a
(Weighted Percentages of Total Daytime Travel)

Previous Modes	White	Black	Spanish Heritage	Asian	No. of Trips Rep.
Bus	39%	56%	53%	48%	20,700
Car	59%	41%	43%	50%	26,800
Walk/Other	2%	3%	4%	1%	1,100

^a Includes only those travelers who made the same trip before BART.

Source: 1976 BART Passenger Profile Survey and Peat, Marwick, Mitchell & Co., Survey Analysis of Travel By Automobile, Bus and BART, December, 1976. Reported in: Jefferson Associates, Inc. Travel By Ethnic Minorities in the BART Service Area. (Draft Working Note). November, 1977.

Since BART was designed principally to serve peak-hour, long distance work trips to the downtown centers from the outlying suburban residential areas of the region, it is not surprising that ethnic minority ridership on the system is not higher than it is. On the other hand, due to the fact that many stations are located in predominantly minority neighborhoods and since there exist higher levels of dependency on public transportation among the minority population, relatively high rates of minority use might have been expected.

The Primary BART Service Area (PBSA) is the subset of travel zones in the Greater BART Service Area, which accounts for approximately 80 percent of all BART trip origins and 62 percent of the GBSA population. Within this immediate service area, ethnic minority persons live in greater population concentration than in the GBSA as a whole. As shown in Table III-12, the daily BART trip-making rate per 100 PBSA population is significantly lower for the Black population (7.7) within this area than it is for the White population (9.8), and substantially lower for the Spanish-heritage population of the PBSA (4.3). It is, however, higher for the Asian population (12.1).

Table III-13 indicates a lower rate of total trip-making for ethnic minority travelers, but a generally equivalent rate of BART trip-making to that of the White population. However, compared to the transit usage patterns of Whites (9.3%), it is important to note that substantially higher percentages of the trips of Blacks (17.0%) and Others (19.7%) are made on the bus and streetcar systems of the area.

Analysis of the ethnic composition of BART ridership for each origin station with the station area's population suggests that in ethnic minority areas, minority residents are less likely to use BART than non-minority residents living equally close to BART.*

The potential travel service benefit for ethnic minorities of a new rapid rail element in the total transportation system of the area has been constrained by a number of factors. The most important of these is that for shorter distance trips,

* For additional discussion of this analysis, see Urban Dynamics Associates. Implications of BART's Mobility and Accessibility Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 35-10-78. Metropolitan Transportation Commission, Berkeley. April, 1978.

Table III-12

RATE OF DAILY BART USE IN THE
PRIMARY BART SERVICE AREA*
(Daily BART Trips per 100 Population 16 Years of Age and Over)

Ethnic Category	Primary BART Service Area		Estimated 1975 Population ^b		Rate Per 100 Persons (16 yrs. or Older)
	Percent	Daily BART Trips ^a Number	Primary BART Service Area Percent	Number	
White	72. 7%	76, 800	67. 1%	785, 400	9. 8
Black	11. 2	11, 800	13. 0	152, 500	7. 7
Spanish-heritage	5. 9	6, 200	12. 3	143, 500	4. 3
Asian and Others	10. 2	10, 800	7. 6	80, 400	12. 1
TOTAL	100. 0%	105, 600	100. 0%	1, 170, 800	9. 0

* Primary BART Service Area (PBSA): The 132-zone area of the 239-zone GBSA which accounts for an estimated 80 percent of all BART origins and 62 percent of the GBSA population.
 a Source: PMM & Co. Travel in the BART Service Area. Document No. WP 35-5-77. September, 1977. Passenger Profile Survey 1976. Weighted by Ethnic Category for differential response rates. Figures assume same ethnic distribution of PBSA BART Trip as GBSA.
 b Source: PMM & Co. Demography of Areas Served By BART. (Working Note: Work Element IV-6), October, 1977; and population estimates developed by staff of the Metropolitan Transportation Commission.

Table III-13

TOTAL VEHICLE TRIPS PER SEVEN-DAY WEEK
BY TRAVEL MODE AND ETHNIC CATEGORY
FOR POPULATION 16 YEARS OF AGE AND OLDER
(May, 1975)

	White		Black		Other*		All Persons	
	Rate per wk.	Percent	Rate per wk.	Percent	Rate per wk.	Percent	Rate per wk.	Percent
Auto (Drive and Ride)	19.24	89.2%	11.41	81.0%	4.20	75.1%	15.54	87.6%
BART	.32	1.5	.28	2.0	.29	5.2	.31	1.7
Bus and Streetcar	2.01	9.3	2.40	17.0	1.10	19.7	1.88	10.6
All Modes	21.57	100.0%	14.09	100.0%	5.60	100.0%	17.73	100.0%

* Include Spanish-heritage, Asian and other minorities.

Source: Peat, Marwick, Mitchell & Co. Travel in the BART Service Area. Document No. WP 35-5-77. September, 1977. Table 19. Based on Analysis of 1975 BART Passenger Profile Survey (BART trip) and 1975 Areawide Travel Survey (Bus and Auto trip). Differential response rate data from PPS76 used to weight responses by ethnic category.

BART does not compete well with the generally adequate and higher levels of conventional transit services existing in most central areas where ethnic minorities live in the greatest concentrations. Other factors, such as higher user costs, lack of schedule reliability and cultural factors, including language barriers, contribute to a lesser extent in minimizing BART's potential travel service benefit for these population subgroups.

ISSUE NUMBER 2-4: "Has BART operation adversely affected minorities by causing reductions in AC transit and MUNI service in ethnic minority areas?"

If recommended local transit service line adjustments had been fully implemented within the BART travel corridor, ethnic minorities would have been disproportionately affected, given patterns of residential location and greater levels of transit dependency. Concentrations of the Spanish-heritage, Black and Asian populations are generally located within the central, higher density areas of the BART service area. These areas are generally well served by the local public transportation services operated in the Bay Area — buses, streetcars, trolleys and cable cars. Because of their more central location, ethnic minority neighborhoods typically have high densities of transit lines with frequent headways. Many ethnic minority neighborhoods, especially Spanish-heritage and Black, are near BART lines and stations located in the urban areas of the area where bus and streetcar service levels are relatively high.

Public protest blocked implementation of most service eliminations or reductions in AC Transit and MUNI operations. Thus, despite somewhat lower local transit ridership in this corridor, the overall level of local transit service has not been downgraded to any appreciable extent. The net effect of BART's introduction has been to increase total transit accessibility for ethnic minorities living in the BART corridor over that provided by the hypothetical No-BART Alternative.

However, there is some indication that with growing operational deficits, BART has probably caused a reduction in State and regional funding to local transit operators over that which would have been available under the No-BART Alternative. Table III-14 shows the estimated net financial impact of BART on the annual operating costs of transit services in the three county BART District compared to the estimated costs of the No-BART Alternative which, as previously described, assumes a lower level of transit services. No analysis has been conducted in the BART Impact Program to determine what level and types of transit services could have been provided in the area, had BART not been built, for the estimated \$28.4 million additional annual operating deficit funds associated With-BART. Given a level of funds committed to transit services comparable to the With-BART system, the question remains whether adequate suburban commuter express services, along with upgraded urban area bus and streetcar services, could have been achieved if BART had not been constructed. As financial pressure increases on the budget of the area's public transportation operators, it is possible that system cost-effectiveness considerations may lead to reduced bus service on lines parallel to BART, affecting lower-income ethnic minorities negatively to a greater extent than others.

ISSUE NUMBER 2-5: "Has BART's potential benefit for the handicapped been realized with the provision of a largely barrier-free rapid rail facility?"

Despite the extensive provision of facilities and consideration of the handicapped in the design of BART facilities, its full potential to substantially increase the mobility of disabled persons has not been realized. BART provides a special fare program for the elderly (90% discount, green ticket) and the disabled (75% discount, red ticket). As shown in Table III-15 and III-16, use of BART by the disabled is relatively low; however, there is some indication that it is increasing at a rate faster than the growth of total ridership. An estimated 1.8 percent of the employees surveyed in the Workplace Survey are disabled. The ratio of BART use by these workers versus BART use by able-bodied workers is substantially higher than for other modes (see Table III-17).

Table III-14

BART IMPACT ON THE OPERATING COSTS
AND FINANCING OF REGIONAL TRANSIT¹

FY 1976

(In Thousands of Current Dollars)

	AC Transit	MUNI	BART	Net Impact
Operating Expenditures	(\$1, 451) ²	(\$7, 726)	\$55, 853	\$46, 676
Operating Revenues				
Fares & Interest	(\$2, 350)	(\$2, 638)	\$23, 221	\$18, 233
Property Tax	\$ 899	--	\$ 5, 029	\$ 5, 928
Sales Tax	--	--	\$21, 021	\$21, 021

¹ The BART impact on regional transit operating costs is the difference between regional transit costs with BART and without BART. This table illustrates differences in the transit revenues and costs.

² Numbers in parentheses are negative numbers.

Source: Metropolitan Transportation Commission. "The No-BART Alternative Financing Plan." February, 1977.

Table III-15

TYPE OF TICKET USED BY
BART USERS BY AGE^a

Age	Regular (Blue)	Disabled (Red)	Elderly (Green)	SAMPLE TOTAL	
Under 18	92.8%	0.0%	7.2%*	252	1.9%
18-64	98.3	1.2	0.5	12,611	93.5
Over 64	7.6	2.3	90.1	631	4.7
SAMPLE TOTAL	12,682 (94.0%)	182 (1.4%)	630 (4.6%)	13,494 (100.0%)	100.0%

* Age and color of ticket was self-reported. These 18 cases were evidently erroneously reported.

Table III-16

PHYSICAL OR OTHER CONDITION MAKING BART
USE DIFFICULT: BART USERS BY AGE^a

Age	No	Yes	SAMPLE TOTAL	
Under 18	96.7%	3.3%	243	1.8%
18-64	98.0	2.0	12,600	93.6
Over 64	99.2	.8	624	4.6
SAMPLE TOTAL	13,203 (98.0%)	264 (2.0%)	13,468 (100.0%)	100.0%

^a Source: Passenger Profile Survey 1977. Weighted File By Station.
Creation Date September 1, 1977, BART, Marketing Research
Department.

Table III-17

FREQUENCY OF PHYSICAL DISABILITY AMONG EMPLOYEES AND
PRINCIPAL MODE OF TRAVEL TO WORK IN BART
WORKPLACE ACCESS STUDY SUB-AREA^a

Disability Reported ^b	Principal Mode of Travel to Work					TOTAL: All Modes Expanded Sample
	BART	Other Public Transit	Carpool	Drive Auto Alone	Walk	Other
Yes	19.5%	21.0%	5.4%	49.2%	4.2%	0.7%
No	11.6%	18.1%	8.1%	54.6%	5.4%	2.1%
TOTAL Expanded Sample	54,991	85,081	37,707	254,910	24,910	9,775
						8,425 100.0%
						458,950 100.0%
						467,375 100.0% (100.0%)

^a Source: Peat, Marwick, Mitchell & Co. Tabulations of Workplace Survey: Weighted File. Creation Date October 14, 1977.

^b Question: "Do you have any physical disability that has lasted six months or more, which limits or prevents your getting to or using any of the transportation methods listed on the preceding pages?" (Walk, Train, Bus, Auto).

With increased service levels, improved equipment reliability, and implementation of needed design modifications identified by BART planners, greater utilization can be expected. Also, projected accessibility improvements in local bus feeder and para-transit systems will remove existing obstacles in getting to and from BART stations. Curb cut and ramp construction programs underway in Berkeley, Oakland and San Francisco are removing many level access barriers to movement beyond station areas.

With these improvements, it is clear that BART will have substantially achieved the goal of providing the opportunity of increased mobility for handicapped persons within the Bay Area by the elimination of barriers which previously have precluded travel for many handicapped persons. However, a continuing effort will be required to assure maximum benefit to the handicapped population who face many problems and require consideration of their total travel needs from home to destination.

Economic, Employment and Financial Impacts on the Transportation Disadvantaged

Six issues relating to the economic, employment and financial impacts of the BART system for the transportation disadvantaged have been investigated in the ITD Project. Information developed in the various project areas of the BART Impact Program has been applied in the evaluation of each issue. A brief summary of the findings of Work Element 3.3: Economic, Employment and Financial Issues follows.*

ISSUE NUMBER 3-1: "Does BART provide increased opportunity of employment for minority central city residents by increasing accessibility to outlying suburban office, commercial and industrial areas?"

* All BIP document sources used in Work Element 3.3 are referenced in the Technical Memorandum. Urban Dynamics Associates. The Implications of BART's Economic, Employment and Financial Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-TM 36-10-78. Metropolitan Transportation Commission, Berkeley. March, 1978.

Analysis of BART's overall impact on accessibility to employment locations in the Bay Area, has shown that while BART's impact has been modest (average 5 minute travel time savings to the top 50 employment zones), the largest accessibility gains have been from outlying residential areas to downtown workplaces in San Francisco, Oakland and Berkeley. Accessibility modeling analyses conducted in the BART Impact Program have not permitted the testing of the proposition that accessibility gains from central residential areas to outlying employment areas may be comparable to suburban-to-CBD average accessibility gains. BART has provided transit service to some outlying areas which are not served in the No-BART Alternative. But generally, station access to workplaces in outlying areas is poor both in terms of walking distance and egress-related bus service. Where outlying stations do provide good access to workplaces, it may be concluded that BART has provided increases in accessibility to outlying employment opportunities for some central area minority residents.

However, based on analysis shown in Table III-18 of the work travel patterns of ethnic minorities living in the Daly City Corridor in San Francisco and those living in Oakland in the East Bay, the actual volume of commute trips to outlying employment centers appears negligible, by any mode including BART. An exception to this conclusion may be for work travel from Oakland to workplaces located within the Fremont Corridor.

More Black and Spanish-heritage Oakland residents work at employment sites within this corridor than in any other work zone area in the region. Additionally, BART's share of these commute trips is relatively high (19.6% of trips by Blacks, 20.8% of trips by Spanish-heritage). However, the Fremont Corridor is very large as delineated for this analysis, including close-in employment zones within the City of Oakland. The proportion of work trips which actually represent commuting to "outlying" workplaces is certainly less than total work travel to this destination work-zone area. Overall, it does not appear that BART has had, as yet, a major impact on the access of central area minority residents to outlying employment opportunities.

Table III-18

EMPLOYMENT LEVELS AND PRINCIPLE MODE OF TRAVEL BY ETHNIC CATEGORY:
FROM OAKLAND HOME AREA TO SELECTED WORKPLACE CORRIDORS

	Downtown Workplace Areas		East Bay Workplace Corridors (Non-Oakland CBD)		
	San Francisco CBD	Oakland CBD	Richmond ^c	Concord	Fremont
White					
BART	(13.7%) ^a	(33.5%)	(10.7%)	(1.6%)	(14.3%)
Other Transit	14.3% ^b	8.7%	3.7%	25.6%	7.6%
Auto	47.5	33.6	11.3	0.0	3.6
	38.2	38.6	62.6	74.4	88.8
Black					
BART	(11.0%)	(19.5%)	(13.6%)	(1.8%)	(37.3%)
Other Transit	34.8%	11.9%	0.0%	0.0%	19.6%
Auto	31.6	22.0	3.7	0.0	6.6
	33.6	47.4	91.8	100.0	69.4
Spanish-heritage					
BART	(12.8%)	(32.7%)	(2.5%)	(0.0%)	(39.1%)
Other Transit	16.6%	0.0%	--	--	20.8%
Auto	34.1	20.5	--	--	22.0
	49.7	42.3	--	--	50.2
Asian					
BART	(14.0%)	(54.6%)	(2.0%)	(0.0%)	(16.9%)
Other Transit	14.2%	6.9%	--	--	0.0%
Auto	34.6	17.9	--	--	21.3
	51.1	44.8	--	--	78.7

^a () indicates percent of all work travel represented by specific ethnic group from Oakland home area to each of selected destination workplace corridors.

^b Indicates percent of work travel made by ethnic group represented by mode of travel. Column does not add up to 100% since "other" modes are not shown.

^c Includes all of Oakland home area excluding Oakland CBD.

Source: Urban Dynamics Associates. Metropolitan Transportation Commission. Tabulation of Workplace Survey File. Creation Date, October 25, 1977. Peat, Marwick, Mitchell and Co., Inc.

ISSUE NUMBER 3-2: "Is BART a catalyst for minority business enterprises and minority employment in and around the stations?"

To the extent that BART would increase the accessibility of an area where a station was located, increase pedestrian and vehicular circulation, or stimulate supporting land use policies encouraging commercial and office activities, it could be expected that expanded business and employment opportunities would occur around many BART stations. The results of the Land Use and Urban Development Project of the BART Impact Program to date suggest that these impacts have not occurred to the extent anticipated. Outside the central business areas of San Francisco and Oakland, where an indirect effect of BART is cited, little change in the character or extent of commercial and office activities has occurred as of yet in the BART experience. Two exceptions to this conclusion have been a ten-story office building in Walnut Creek and a new courthouse building in Fremont, both located where they did because of BART.

Within non-downtown ethnic minority neighborhoods in the older, mixed land use areas of the urban part of the region, generally no major economic impact has been expressed in terms of significant new land use developments. A possible exception may be the public sector employment opportunities which may result from the construction of public facilities planned as part of the redevelopment program around the predominantly Black, downtown Richmond station.

Opportunities for retail and service business enterprises within BART stations have been limited to date to telephone, vending machine, locker and other lease arrangement contracts which have been awarded to larger firms, none of which have been minority owned enterprises. On September 22, 1977, the District approved a one year test program which may significantly expand concession opportunities for smaller retail and service enterprises within many BART stations, particularly for minority owned businesses. Permits to operate concessions during the one year evaluation period are to include newsstands, news-racks and vendors, shoeshine, cleaner, flower stands, stamp

vending and other convenience vending concessions. Six concession permits have been awarded to small businesses, mostly minority owned, in four station areas to date — Daly City, Powell Street, Oakland City Center-12th Street, and Concord. It is estimated that an additional nine will be awarded during one year evaluation period of the program. If successful and supported by affirmative action policies, this experimental permit program will provide limited new business opportunities for minority owned enterprises that are a direct result of BART.

ISSUE NUMBER 3-3: "What has been the level and significance of BART's direct employment for minorities?"

The transit industry has historically been an active employer of ethnic minorities in the Bay Area. BART has also provided substantial direct employment benefits for ethnic minorities in the region. As shown in Table III-19, during BART's peak construction period from 1967 to 1971, as many as 35 percent of the construction work force were ethnic minority workers. The long-term potential impact of BART's construction hiring for improved ethnic minority employment opportunities may have been relatively small since minorities were underrepresented in supervisory and skilled job categories, while predominantly employed in laborer jobs with the smallest job advancement potential.

BART's operations provided approximately 750 ethnic minority persons with permanent jobs in 1976. As shown in Table III-20, this represents 40 percent of BART's labor force, a somewhat lower proportionate level than represented by the 2,676 minority employees of AC Transit and San Francisco MUNI combined (49 percent). BART's rate of minority employment is higher than the representation of ethnic minorities in the BART District population (32.6 percent).

Comparison with the No-BART Alternative (NBA) indicates that total employment is greater in the existing With-BART public transit system by approximately 1,300 employees, providing somewhat higher total minority employment. However, the NBA represents a substantially lower level of transit services

Table III-19

MINORITY REPRESENTATION OF BART
CONSTRUCTION WORKERS AND SAN FRANCISCO/
OAKLAND UNION MEMBERSHIP

Trade	Percent of BART Construction Work Force ^a (1967-1971)	Percent Membership: Referral Unions ^b San Francisco/ Oakland SMSA
<u>Total Work Force</u>		
Non-Minority	65%	87%
Minority	35%	13%
<u>Electricians</u>		
Non-Minority	91%	89%
Minority	9%	11%
<u>Plumbers</u>		
Non-Minority	92%	93%
Minority	8%	7%
<u>Carpenters</u>		
Non-Minority	83%	82%
Minority	17%	18%
<u>Laborers</u>		
Non-Minority	39%	69%
Minority	61%	31%

^a BART On-Site Construction Work Force Ethnic Data Counts, 1967-1971.
(Numbers represent the mean for 1967 through 1971.)

^b Equal Employment Opportunity Commission, Local Union Report EEO-3, 1969. (An annual survey of referral unions with 100 or more members.)

Source: McDonald & Grefe, Inc. The Economic Impacts of BART Capital and Operating Expenditures. BART Impact Program. Document No. DOT-BIP-TM 29-7-77. Metropolitan Transportation Commission, Berkeley. October, 1977.

Table III-20

COMPARISON OF MINORITY EMPLOYMENT PATTERNS:
BART, AC TRANSIT AND SAN FRANCISCO MUNI
OPPORTUNITY BY JOB CATEGORY, 1976*

Job Category	<u>BART</u>		<u>AC Transit and San Francisco MUNI</u>	
	% Work Force	Minority % of Category	% Work Force	Minority % of Category
Officials/Administrators	16%	30%	3%	15%
Professionals	12	26	5	48
Technicians	3	30	4	40
Protective Services	5	44	3	26
Skilled Crafts	42	41	11	24
Office/Clerical and Para professionals	10	47	11	34
Service/Maintenance	12	43	64	60
TOTALS: Percent	100%	40%	100%	49%
Number	1,865	750	5,411	2,676

* It should be noted that the reliability of comparisons between agencies is limited by variations in job classification definitions used by the different transit operators.

Source: McDonald & Grefe, Inc. The Economic Impacts of BART Capital and Operating Expenditures. BART Impact Program. Document No. DOT-BIP-TM 29-7-77. Metropolitan Transportation Commission, Berkeley. October, 1977.

provided in the region. Since conventional bus and streetcar systems are more labor-intensive, and in the case of the Bay Area have a higher representation of minority employees, a different no-BART alternative which provided equivalent levels of transit services for the area would probably have greater impact on minority participation in the area's transit work force than the with-BART system. However, the with-BART system is characterized by greater opportunities for minorities within higher income and job classification levels than in the No-BART Alternative.

ISSUE NUMBER 3-4: "Has BART lead to higher property taxes around stations, which in turn, force out ethnic minorities and the elderly?"

Increased assessed property valuation of housing in the vicinity of BART stations would imply the heaviest burden on the elderly and lower-income households, many of which are ethnic minorities living in rental units in low and moderate cost housing. BART's impacts on taxable property could result from either higher development market potential of station areas, resulting from perceived increases in accessibility, or from public land use control and redevelopment programs. At this point in the BART Impact Program studies, there is not sufficient evidence to determine if assessed property values have increased substantially around station areas, including those with high concentrations of ethnic minority population subgroups; or that these changes, if they have occurred, are related to BART. A definitive conclusion to this issue must await the findings of the incomplete property value study of the Land Use and Urban Development Project. However, the record of actual construction activities around BART stations, the relatively small impact of BART on housing development and rehabilitation activity suggest that, residential property values have not increased substantially around most non-downtown BART stations as a result of BART.

The reader should also see Issues Number 4-4 and 4-5 for more discussion of BART's impacts on property values around stations.

ISSUE NUMBER 3-5: "Has BART's financing plan implied a disproportionate burden for low income persons, e.g. ethnic minorities, handicapped and the elderly?"

BART has been an important factor in the high level of financial burden of supporting transit in a region which already had, before BART, one of the highest levels of per capita funding of public transportation in the country. Total capital costs of BART's construction, including interest payments on general obligation bonds used to finance the system, will amount to approximately \$2.3 billion. Annual operating costs in 1976-77 were \$66.8 million of which less than 40 percent was paid for by user fares.

The financing program used to pay for both BART's construction and annual operations has relied heavily on local BART District taxes on property and retail sales. As shown in Tables III-21 and III-22, incidence analysis of the burden of BART shows that area households have paid the majority of the local share of both BART's capital and operation costs.

Tables III-23 and III-24 show the analysis of the incidence of BART taxes on various representative household types of differing size, incomes and living standards. For the annual operating deficit of BART in 1975-1976, the estimated tax payments for these households ranged from around five dollars to forty-two dollars. These tables reveal that, while the more affluent family pays a higher absolute amount to support BART, a heavier burden proportionate to income falls on low-income families and individuals. Since ethnic minority and elderly households represent a relatively large proportion of low and moderate income groups in the region, a disproportionate burden of BART's financing is borne by these households in terms of higher percentages of income used for local tax support of BART. This relates directly to the "ability-to-pay" notion of equity in public financing discussed in Chapter IV of this report. The fact that many households pay BART taxes who do not use the system, relates to the "cost-benefit" notion of equity also discussed in Chapter IV.

Table III-21

TOTAL BURDEN OF BART'S CAPITAL COSTS
THE INCIDENCE OF PROPERTY AND SALES TAXES
1964-1999
(In Thousands of Current Dollars)

Sector of Three County BART Service Area	Property Tax	Sales Tax	Total	Percent of Total
Households	\$ 982, 989	\$132, 252	\$1, 115, 241	65.0%
Businesses	379, 131	36, 848	415, 979	24.2
Export	168, 163	18, 800	186, 963	10.9
Unallocated	- 1, 529	--	- 1, 529	0.1
Total	\$1, 528, 754	\$188, 000	\$1, 716, 754	100.0%

Table III-22

FINAL INCIDENCE OF OPERATING REVENUES
BART IMPACT IN FY 1976
(In Thousands of Current Dollars)

Sector of Three County BART Service Area	Property Tax	Sales Tax	Total	Percent of Total
Household	\$3, 790	\$14, 798	\$18, 588	69.0%
Business	1, 471	4, 120	5, 591	20.7
Export	669	2, 102	2, 771	10.3
Unallocated	- 2	-	- 2	0.0
TOTAL	\$5, 928	\$21, 020	\$26, 948	100.0%

Source: McDonald & Grefe, Inc. Distribution of the Tax Burden of Financing BART's Construction and Operations. BART Impact Program. Document No. DOT-BIP-TM 30-7-77. Metropolitan Transportation Commission, Berkeley. July, 1977.

Table III-23

TAX BURDEN OF TYPICAL HOUSEHOLDS
FOR BART CAPITAL EXPENSES, 1975-1995

Group No.	Income	Household Description	Property Tax	Sales Tax	Total Tax Burden	Tax Burden As Percent of Income
1	\$ 4, 489	Individual, lower living standard, over 65, retired	\$22. 54	\$ 9. 86	\$32. 90	0. 72%
2	\$10, 041	Individual, low-moderate living standard	\$15. 98	\$15. 97	\$31. 95	0. 32%
3	\$10, 277	Couple, low-moderate living standard	\$34. 14	\$16. 44	\$50. 58	0. 49%
4	\$ 6, 851	Couple, low-moderate living standard, head over 65	\$24. 18	\$14. 09	\$38. 27	0. 56%
5	\$15, 711	Couple, moderate living standard	\$35. 38	\$21. 13	\$56. 51	0. 36%
6	\$ 8, 859	Family of 3, low-moderate living standard	\$34. 14	\$16. 44	\$50. 58	0. 57%
7	\$14, 411	Family of 3, moderate living standard	\$34. 14	\$16. 44	\$50. 58	0. 35%
8	\$ 2, 362	Family of 4, poverty-level living standard, female head of household	\$10. 93	\$ 4. 70	\$15. 63	0. 66%
9	\$21, 735	Family of 4, high living standard	\$40. 99	\$29. 12	\$70. 11	0. 32%
10	\$45, 715	Family of 4, affluent living standard	\$71. 86	\$39. 45	\$111. 31	0. 24%
11	\$18, 191	Family of 6, moderate living standard	\$39. 90	\$26. 38	\$66. 28	0. 36%

Source: McDonald & Grefe, Inc. Distribution of the Tax Burden of Financing BART's Construction and Operations, BART Impact Program. Document No. DOT-BIP-TM 30-7-77. Metropolitan Transportation Commission, Berkeley. July, 1977.

TAX BURDENS OF TYPICAL HOUSEHOLDS
FOR BART OPERATING EXPENSES, 1975-1976

Group No.	Household Description	Income	Property Tax	Sales Tax	Total Tax Burden	Tax Burden as Percent of Income
1	Individual, lower living standard, over 65 retired	\$ 4,489	\$2.68	\$ 8.30	\$10.98	0.24%
2	Individual, low-moderate living standard	10,041	1.90	13.44	15.34	0.15
3	Couple, low-moderate living standard	10,277	4.06	13.83	17.89	0.17
4	Couple, low-moderate living standard, head over 65	6,851	2.87	11.86	14.73	0.21
5	Couple, moderate living standard	15,711	4.20	17.79	21.99	0.14
6	Family of 3, low-moderate living standard	8,859	4.06	13.83	17.89	0.20
7	Family of 3, moderate living standard	14,411	4.06	13.83	17.89	0.12
8	Family of 4, poverty-level living standard, female head of household	2,362	1.30	3.95	5.25	0.22
9	Family of 4, high living standard	21,735	4.86	24.50	29.36	0.13
10	Family of 4, affluent living standard	45,715	8.53	33.20	41.73	0.09
11	Family of 6, moderate living standard	\$18,191	\$4.70	\$22.20	\$26.90	0.15

Source: McDonald and Grefe, Inc. Distribution of the Tax Burden of Financing BART's Construction and Operations, BART Impact Program, Document No. DOT-BIP-TM 30-7-77. Metropolitan Transportation Commission, Berkeley. July, 1977.

Because of the 1964 enacted UMTA Section III Transit Capital Assistance Grant Program, the burden of financing the construction of a major commuter rail system in another region today would not impose as heavy a burden on local households in general, or the transportation disadvantaged in particular, as it has in the BART experience. Encountering shortfalls in fare revenues, unanticipated and escalating operational costs, BART has relied heavily on regressive local taxes to support operations. As shown in Table III-25, compared to the bus and streetcar operators in the BART District, BART's revenues support about the same proportion of total costs. But, the more substantial level of federal and state assistance for bus operations in the area is associated with lesser requirements on local, regressive tax sources in their budgets than in BART's operating budget.

ISSUE NUMBER 3-6: "Is BART's fare policy inequitable in terms of user cost per mile, and if so, does this affect ethnic minorities to a greater degree than the general population?"

From the beginning of operations, BART has employed a fare structure which is graduated for distance of travel and which is therefore more equitable than a flat fare or limited zone fare system such as utilized by the area's bus operators, in terms of cost per mile. Table III-26 outlines the components of BART's current fare structure and indicates the changes implemented in November, 1975. BART's initial fare structure included reduced costs per mile for long trips. The fare for shorter BART trips was generally increased more than for long trips.

Since ethnic minority travelers in the Bay Area live closer-in to the central areas of the region, where typical travel distances are shorter, average user costs per mile are higher than for the general population. As shown in Table III-27, average fare per mile for trips to the San Francisco CBD is approximately 25 percent higher from stations located in areas of high ethnic minority concentration than from stations in areas of low ethnic minority concentrations.

Table III-25

ANNUAL 1976-77 OPERATING EXPENSES AND SOURCE
OF FUNDING: BART, AC-TRANSIT AND SAN FRANCISCO MUNI

	BART	AC-Transit	MUNI
Total Operating Expenses (\$ Millions)	\$66.8	\$53.1	\$71.8
(Percent of Three Systems)	34.8%	27.7%	37.4%
Source of Operating Funds	Percent Total Operating Expenses (Adjusted)		
• Fare and Other Operating Revenue	39.2%	36.8%	33.3%
• Local Property & Sales Tax	63.8%	39.1%	46.9%
— Property	8.3%	39.1%	46.9%
— Sales	47.2%	--	--
• Federal, State and Other	5.7%	25.6%	15.0% ^a
TOTAL Revenues as Percent of Total Operating Expenses	100.4%	101.5%	95.2%

^a Includes Revenue Sharing Funds (\$5 million).

Source: Metropolitan Transportation Commission. Audited 1976-77 Statements of Operations for San Francisco Bay Area Rapid Transit District, Alameda-Contra Costa Transit District, and San Francisco Municipal Railway.

Table III-26

SUMMARY OF CHANGES IN BART FARE STRUCTURE

User Charge Component	Initial	Current (November 3, 1975)
Minimum Fare for Trips up to 6 miles	\$.30	\$.30
CBD Fare (under 2 miles)	—	\$.25
Suburban Zones ^a	—	\$.30
Trips 6-14 miles	\$.35 + \$.03/mile	\$.40 + \$.05/mile
Trips 14-20 miles	\$.59 + \$.03/mile	\$.80 + \$.02/mile
Trips 20-25 miles	\$.77 + \$.03/mile	\$.92 + \$.01/mile
Trips over 25 miles	\$.92 + \$.01/mile	\$.97 + \$.01/mile
Transbay Surcharge	\$.15	\$.25 ^b
Daly City Surcharge	\$.00	\$.15 ^c
Scheduled Speed Component	+/- \$.02/mile	+/- \$.02/mile
Resulting Highest Fare	\$1.25	\$1.45
Average Fare (weighted by expected patronage)	\$.63	\$.76
Parking Charges	none	none

^a Concord to Orinda (13.0 miles); Fremont to Bay Fair (12.8 miles); and Richmond to Ashby (8.6 miles).

^b Transbay from Richmond line involves transfer and thus surcharge remained at \$.15.

^c Does not apply to Transbay trips.

Source: General Manager, BARTD. "Fare Increase and Park Change Proposal." Inter-Office Communication. August 6, 1975.

Table III-27

AVERAGE FARE FROM HIGH AND LOW ETHNIC
POPULATION STATION AREAS TO MONTGOMERY
STREET TO SAN FRANCISCO CBD STATION^a

Station Area Category	Average Fare	Average Distance	Average Cost/Mile
(16) High Ethnic Concentration	\$. 69	10. 8 miles	6. 4¢ /mile
(14) Low Ethnic Concentration	\$1. 11	21. 7 miles	5. 1¢ /mile

^a Unweighted by actual trips.

Source: BARTD. "Mileage and Fare Table." Report T3002. January, 1977.

Figure III-2 graphically shows the relation between the degree of ethnic minority concentration around stations and BART user costs per mile of travel to the San Francisco downtown Montgomery Street station. A fairly strong linear relationship is illustrated in these data, with cost per mile increasing with increasing minority concentration. Decreasing marginal fare per mileage increment favors the long distance BART travelers, who are more likely to be White, upper-income suburban residents.

Land Use and Urban Development Impacts on the Transportation Disadvantaged

Six issues relating to the land use and urban development impacts of the BART system for the transportation disadvantaged have been investigated in the ITD Project. Information developed in the various project areas of the BART Impact Program has been applied in the evaluation of each issue. A summary of the findings of Work Element 3.4: Land Use and Urban Development Issues follows.*

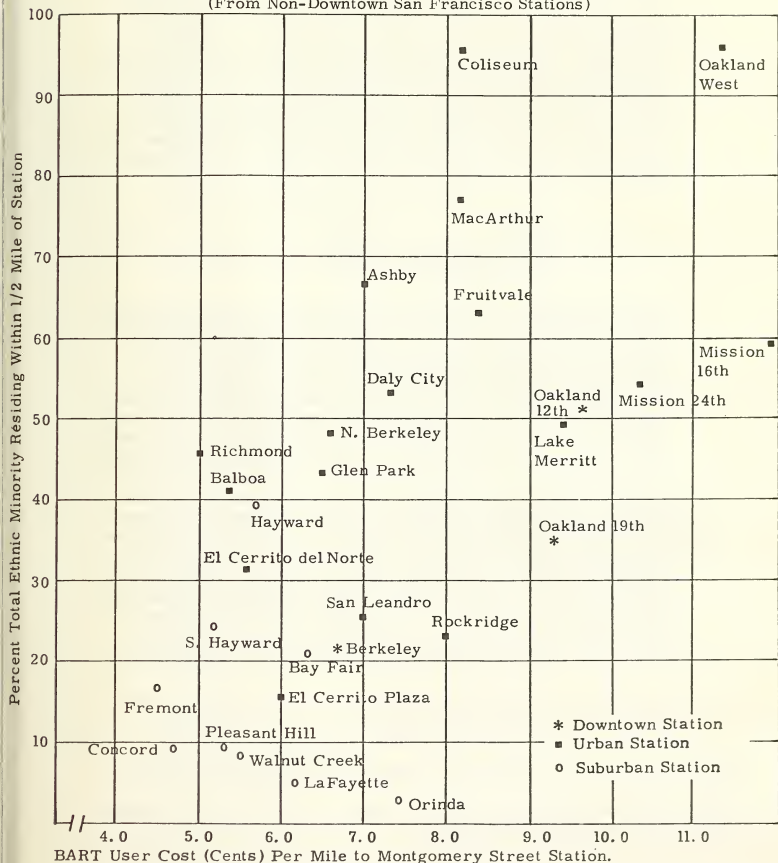
ISSUE NUMBER 4-1: "Has BART contributed to an increase in the concentration of ethnic minorities in the central cities?"

If BART were to substantially improve the accessibility of the outlying suburban areas of the region, it might be expected that it would significantly affect residential location decisions. A trend toward proportional increase in the ethnic minority population within the central city areas might be reinforced or accelerated as a result, since BART's related accessibility gains might largely affect the majority White population, given economic, social and other discriminatory barriers to suburban area relocation for ethnic minorities.

* All BIP document sources used in Work Element 3.4 are referenced in the Working Paper: Urban Dynamics Associates. The Implications of BART's Land Use and Urban Development Impacts for the Transportation Disadvantaged. BART Impact Program. Document No. DOT-BIP-WP 56-10-78. Metropolitan Transportation Commission, Berkeley. April, 1978.

Figure III-2

FARE TO SAN FRANCISCO CBD (MONTGOMERY STREET STATION)
 VERSUS DEGREE OF ORIGIN STATION AREA ETHNIC MINORITY
 POPULATION CONCENTRATION (Population within One-half Mile)
 (From Non-Downtown San Francisco Stations)



BART User Cost (Cents) Per Mile to Montgomery Street Station.

Source: BARTD. Mileage Fare Table, Report T3002. January, 1977; and McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

There exists a substantial degree of ethnic minority residential concentration within San Francisco and Oakland and the trend indicated by 1960 and 1970 census data shows that minority concentration is increasing in these central cities. Analysis by ethnicity of occupant of housing inventory data collected in 1975, indicates that this trend has continued since 1970.* The proportion of the total four-county area (San Francisco, Alameda, Contra Costa and San Mateo) ethnic minority population who live in the central cities of either San Francisco or Oakland is substantially greater than for Whites as shown in the following figures:

Asian	71.7%**
Black	67.9
Spanish-heritage	39.0
White and Others	29.1

Based on the analysis of the survey results of a panel of approximately 300 workers in downtown San Francisco and Oakland, structured such that around one-half were BART users, the Land Use and Urban Development Project has examined the importance of BART in the residential location decisions. The fact that all respondents were persons working in the downtown areas of the region where BART serves travel needs best, and that a disproportionately high percentage of the panel are BART riders (approximately one-half), clearly indicates that the influence of BART in residential decisions is overstated by this sample of the region's population. For this group, BART was not a factor measurably affecting the decision to move. Approximately 20 percent of the respondents who indicated that they had moved in the past two years cited BART as one of the major considerations affecting housing location preference, 20 percent stated BART was a minor consideration, and 60 percent indicated that BART was not a consideration in the choice of locations. No significant variation is found in these data for socio-

*See discussion of area population growth patterns in Chapter II of this report, Page II-10.

**Percent of area population; 1970 U.S. Census, San Francisco, Alameda, Contra Costa and San Mateo Counties.

economic characteristics of workers — income, occupation, age, education, sex or minority status.

Based on the findings of the Land Use and Urban Development Project there is little indication that BART has measurably affected the regional distribution of population growth. Other development and residential location choice factors appear to be considerably more important in explaining changing population growth patterns and distribution in the Bay Area. While BART has not represented a major factor in countering the trend toward increased concentration of minorities in central cities, apparently it also has not been an important factor in encouraging suburban "White flight".

ISSUE NUMBER 4-2: "Has BART encouraged middle-income minorities to move to suburban areas?"

As found in the investigation of Issue Number 4-1, BART's overall impact on regional demographic changes in the Bay Area is apparently minimal. To the extent that BART has had an impact on residential location decisions, it is evident that BART is more of a consideration for those households how have moved to suburban locations than for those relocating in urban neighborhoods. This apparently reflects the greater accessibility gain provided by BART for outlying areas to central cities.

The limited data which are available do not indicate that BART has encouraged significant numbers of middle income minority central city residents to move to suburban locations. As shown in Table III-28, based on an analysis of a small sample of out-migrants from selected areas of Oakland, a greater rate of middle income White out-migration appears to be continuing. However, BART's influence on these moves is apparently not as important a factor as other variables explaining residential location choice.

ISSUE NUMBER 4-3: "Has BART contributed to a physical upgrading of areas around stations in minority areas by stimulating new construction, rehabilitation, or remodeling of residences and businesses?"

BART's principal contribution to the physical upgrading of areas around stations has occurred where BART has either directly or indirectly affected public capital improvement expenditures, land use policies and regulations, or redevelopment planning. Direct public improvement expenditures around BART stations have been the most substantial in the downtown areas of San Francisco, Oakland and Richmond. Minor streetscape improvements were provided in the case of the Mission Street stations located in the predominantly Spanish-heritage community of San Francisco, using general obligation bond financing and with only limited success in the improvement of the neighborhood's physical setting. New construction activity around BART stations located outside the downtown areas has not been great, and has been less in the older, largely built-up areas where ethnic minorities live in the greatest concentrations. This land use impact pattern is illustrated in Table III-29 for four case study areas examined in the Land Use and Urban Development Project.

Where new construction has occurred around BART stations in minority areas, it generally cannot be attributed to BART. An exception is the case of two major public institutional projects built as part of the downtown redevelopment project located in Richmond with its high proportions of Black residents. In downtown San Francisco, the substantial new construction which has been observed since 1962 can be attributed to BART only indirectly and only in part. Little or no new office or housing construction appears to have occurred as a result of BART in non-downtown urban residential areas where ethnic minorities live in the greatest concentration.

BART has not, as yet, induced increases in rehabilitation of existing housing stock or office space in minority areas. Analysis of bank loan disclosure statements by census tracts conducted in the Land Use and Urban Development Project indicates that housing and office rehabilitation activity is far lower in the immediate area around BART stations within the urban areas in San Francisco, Oakland and Richmond, than is found in comparable areas one to three miles away. The lack of rehabilitation activity in declining mixed use minority areas may indicate a "wait-and-see" attitude by property owners uncertain about BART's ultimate impacts on real estate values. Perhaps more importantly, neighborhood conditions such as the lack of land availability, physical deterioration of structures, poor access and congestion conditions, etc., appear to overshadow any impacts which BART may have had in the typical minority station area.

SELECTED CASE STUDY AREAS:
SUMMARY OF 1965-77 STATION AREA LAND USE CHANGES^a

Urban Residential/High Minority Suburban/Low Minority

	Mission Street (24th St.) (16th St.)	Richmond	Fremont	Walnut Creek
Percent Total Ethnic Minority (Station area population) ^b	54.6% & 59.6%	45.9%	17.2%	8.5%
New Construction (Acres)				
• Single Family Residential	--	0.1	--	1.7
• Multi-Family Residential	--	--	--	1.6
• Commercial & Office	2.5	3.6	35.9	23.4
• Institutional & Government	2.2	11.3	8.6	5.8
• Industrial	.2	--	--	--
• Parking ^c	1.3	2.7	--	0.4
TOTAL	6.2	17.7	44.5	32.9
Demolition-No Redevelopment (Acres)				
• Residential	1.3	5.2	4.6	1.9
• Non-Residential	2.4 3.7	2.8 8.0	-- 4.6	0.7 2.6

^a Station land use analysis area includes all land within 1500 feet of a BART station (162.3 acres).

^b 1970 population within one-half mile of station. McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

^c Includes only land solely devoted to parking; all other land used for parking is assigned to the principal use category: commercial or office, industrial, etc., that parking serves.

Source: John Blayne Associates/David M. Dornbusch & Co., Inc. Program-Wide Case Studies: Findings to Date. BART Impact Program. (Working Note). Metropolitan Transportation Commission, Berkeley. Dec., 1977.

ISSUE NUMBER 4-4: "Has BART encouraged higher densities around stations, which in turn have lead to the displacement of minority disadvantaged households?"

ISSUE NUMBER 4-5: "Have BART's impacts on real estate values around stations, including speculation, affected residents in minority neighborhoods negatively?"

Due to the high degree of interrelationship between these two issues, they have been examined together in the ITD Project.

Increased real estate values in the vicinity of BART stations would imply the heaviest burden on the elderly and lower-income households, many of which are ethnic minorities, living in rental units in low and moderate cost housing. At this point in the BART Impact Program studies, there is not sufficient evidence to determine if property values have increased substantially around station areas, including those with high concentrations of ethnic minority population subgroups, or that these changes, if they have occurred, are related to BART. A definitive conclusion to this issue must await the findings of the property value study of the Land Use and Urban Development Project.

The record of actual construction activities around BART stations, and the relatively small impact of BART on housing development and rehabilitation activity suggest that, residential property values have not increased substantially around most non-downtown BART stations as a result of BART. BART's impact on property values is apparently the least in the older, mixed land use urban areas where ethnic minorities live in the greatest concentrations. As shown in Table III-30, the record of actual construction activity in the twelve year period from 1965 to 1977, shows that the rate of new construction in station areas of low ethnic minority concentration (6.07 units per station per year) has been nearly twice that which has occurred in station areas of high ethnic minority concentration (3.28 units per station per year).

Table III-30

STATION AREA CONSTRUCTION: 1965-1977
DOWNTOWN, HIGH AND LOW ETHNIC MINORITY
STATION AREAS

		Total Number of New Buildings and Facilities		
		Within 1,500 ft.	Balance of Station Area	Total Station Area
DOWNTOWN STATIONS	Downtown Station Areas			
	* 12th Street/Oakland	34	10	44
	* Montgomery	14	12	26
	* Embarcadero	29	2	31
	Berkeley	23	10	33
	19th Street/Oakland	36	16	52
	Civic Center	13	14	27
	Powell	22	11	33
		<u>171</u>	<u>75</u>	<u>246</u>
	Average Per Station Per Year	2.04	.89	2.93
NON-DOWNTOWN STATIONS	Station Areas with Low Concentrations of Total Ethnic Minori- ties ^a			
	Concord	18	41	59
	Pleasant Hill	23	52	75
	Walnut Creek	63	52	115
	Lafayette	16	9	25
	Orinda	9	6	15
	Rockridge	12	2	14
	El Cerrito del Norte	67	152	219
	El Cerrito Plaza	13	6	19
	Fremont	21	18	39
	South Hayward	209	33	242
	Bay Fair	12	11	23
	San Leandro	13	18	31
		<u>476</u>	<u>398</u>	<u>874</u>
	Average Per Station Per Year	3.31	2.76	6.07

(Continued)

Table III-30 (continued)

NON-DOWNTOWN STATIONS (cont.)

	Total Number of New Buildings and Facilities		
	Within 1,500 ft.	Balance of Station Area	Total Station Area
<u>Station Areas with High Concentrations of</u>			
<u>Total Ethnic Minorities</u>			
Richmond	22	7	29
North Berkeley	2	-	2
Ashby	17	11	28
Union City	11	92	103
Hayward	14	7	21
Coliseum	6	17	23
Fruitvale	33	14	47
Lake Merritt	26	23	49
MacArthur	25	24	49
Oakland West	26	19	45
Daly City	11	7	18
Balboa Park	16	8	24
Glen Park	54	50	104
24th Street/ Mission	22	5	27
16th Street/ Mission	17	5	22
	<u>302</u>	<u>289</u>	<u>591</u>
Average Per Station Per Year	1.68	1.61	3.28

* High concentrations of Ethnic Minorities; i. e. greater than 40 percent of total station area population within one-half mile.

a Total ethnic minority population of less than forty percent population within one-half mile of BART station. 1970 U.S. Census of Population. McGuire, Chester. Who Are the Transportation Disadvantaged? BART Impact Program. Document No. DOT-BIP-WP 27-10-77. Metropolitan Transportation Commission, Berkeley. April, 1976.

Source: John Blayney Associates. Based on 1965 and 1977 aerial photographs taken of a 4,000 feet by 4,000 feet square area centered on each BART station. John Blayney Associates/David M. Dornbusch & Co., Inc. Station Area Land Use. BART Impact Program. (Working Paper). Metropolitan Transportation Commission, Berkeley. November, 1977. (Revised Table December, 1977.)

Rezoning to permit higher uses or development of greater density around station areas could be expected to encourage development and increase property values. Of the thirty-four BART station areas, land use policies changes between 1965 and 1975 have resulted in less restrictive controls (up-zoning) for eighteen station areas, seven of which have high concentrations of ethnic minorities. Two of these are downtown station areas. Six of the eight station areas experiencing more restrictive land use policies limiting BART's potential real estate impact are in urban residential areas of high ethnic minority concentration. Neighborhood resident opposition to land use policies supportive of rapid rail was evident in two of the three Public Policy Project residential case study areas. In both the Rockridge station area (majority) and in the Mission District area (minority), public protest blocked higher density land use policies and regulations.

The results of a limited study of BART's impacts on real estate values around two stations in Oakland also supports the hypothesis that BART has, as yet, had little effect on property values in low-income, minority station areas. For both the MacArthur and Coliseum stations, any accessibility impact provided by BART has not been sufficient to overcome existing forces in these physically deteriorating low rent areas which are depressing property values. It is unlikely that subsequent studies will show that significant relocation of lower income tenants has occurred around BART stations as a result of escalating residential property values resulting from BART's impacts on development market potential or land use policies.

ISSUE NUMBER 4-6: "Has BART encouraged more shopping downtown at the expense of shopping districts in ethnic communities?"

Due to the greater accessibility gains provided by BART for commercial activities located in downtown areas, it might be expected that corresponding shifts in retail shopping patterns would occur generally to the disadvantage of shopping areas either not served, or served less well, by BART. Older urban area commercial districts, such as the Mission in San Francisco where many ethnic minority owned and patronized businesses are located, might lose business to the downtown areas.

Despite the fact that many merchants perceive that BART is strengthening the vitality of the Oakland CBD, BART's impacts on commercial activity appear to have been relatively

weak in overcoming other factors which inhibit shopping in the area, namely — unattractive development character in some parts of the downtown area and relatively poor auto access conditions. In downtown San Francisco, there is indication that those consumers that use BART have increased their shopping in downtown San Francisco, but not necessarily at the expense of other areas. Since BART is used by a very small share of the general area population to shop, only about one percent of weekday shopping trips, its impact on the competitiveness of non-downtown shopping districts located in ethnic minority areas is probably relatively minor. A definitive conclusion to this issue must await the complete results of the Land Use and Urban Development Project study of BART's impact on retail sales.

IV. CONCLUSIONS AND IMPLICATIONS OF BART'S IMPACTS FOR THE TRANSPORTATION DISADVANTAGED

It is the overall goal of this special project of the BART Impact Program to identify the implications of the BART experience for the transportation disadvantaged. Considerable discussion has already been given to the definition of the transportation disadvantaged, and the reasons why the ITD Project has focused on the elderly, handicapped and ethnic minorities as the principal subgroups of the general population which are of a special concern for public policy in transportation planning. Also, the basic method selected in the ITD Project for developing implications from the findings of specific issue area investigations has been previously discussed in this report. It is important here, however, to examine what is meant precisely by "implications" and correspondingly, what is the scope and nature of the basic understanding sought in the Implications for the Transportation Disadvantaged Project about BART in particular, and rapid rail transit in general.

It should be clear that all implications are derived from conclusions, which in turn represent an interpretation of empirical findings. In this chapter, conclusions and implications are presented together because of their close interrelationship.

MEANING OF "IMPLICATIONS"

In common usage, the word "implications" is a fairly imprecise term which can suggest a number of different meanings in various contexts. For the ITD Project, it has been useful to consider two basic types of implications in the assessment of BART's impacts on the transportation disadvantaged. These two categories of implications may be conveniently labeled as:

- Effectiveness
- Policy Oriented

EFFECTIVENESS IMPLICATIONS

Implications of this type are those which derive from the evaluation of the effectiveness of BART in achieving various objectives which may be considered relevant to rapid rail investment.

This aspect of implications includes the objective of sorting out the most salient findings as they relate to the overall importance of BART and its relevance to the transportation disadvantaged.

Because of differing social, political and ideological perspectives, implications of this nature will vary considerably among different observers, even when drawn from the same "objective" information. For this reason, the implications of the BART experience for the transportation disadvantaged in the Bay Area are discussed in this report in terms of three alternative perspectives based on differing social, political and economic values.

While implications of this sort may be conveniently termed effectiveness implications, they go beyond limited, technical system effectiveness assessment in that they attempt to evaluate the overall importance and effect of BART as a major public investment and ongoing expenditure in the political economy of the Bay Area. The effectiveness implications in the ITD study are intended to address the extent to which BART has contributed, frustrated or been irrelevant to the fulfillment of broad social, economic and political concerns which go beyond specific transportation performance objectives.

POLICY ORIENTED IMPLICATIONS

A second, but closely related, category of implications consists of policy-oriented implications. These encompass both the consideration of the transferability of BART's findings to other regional settings (predictive) and recommendations regarding local, state and federal policy directions in other parts of the country where fixed-route rail facilities may be considered as part of the planning for such regions (normative).

The policy implications identified in the ITD Project are intended to provide useful recommendations based on what has been learned to date about the BART experience and its broad social, political and economic effectiveness in order to assist policymakers and transportation planners elsewhere.

EFFECTIVENESS IMPLICATIONS OF BART FOR THE TRANSPORTATION DISADVANTAGED

As discussed above, this category of implications is intended to provide for the identification and integration of the more important findings regarding BART impacts on the transportation disadvantaged in order to, at least, suggest the level of effectiveness of BART in contributing to various social, political and economic objectives which may be considered in the evaluation of BART. However, given this basic rationale of the ITD Project, caution is necessary in the interpretation of the findings in two respects.

CAUTION IN INTERPRETATION OF IMPLICATIONS

The BART system is only one, and actually a rather limited, element in the total transportation system of the Bay Area. Its construction occurred, and its operations continue, in a region where other public and private actions and institutions shape the basic fabric of social organization and the quality of people's lives. Expectations of what BART should have accomplished, beyond some set of fairly specific system objectives, must reflect realism about the potential intensity of impacts that one could expect to be associated with a seventy-one mile rail facility. However, BART has represented an important, relatively expensive and innovative experiment, undertaken by the public sector, in which all the dimensions of government responsibility are relevant and the entire scope of its impacts are of interest. The implications of BART for the transportation disadvantaged as a special policy concern require that the assessment of BART's effectiveness not be limited to narrow transportation system objectives.

Secondly, it is necessary to caution against interpretation of BART's effectiveness implications as the result of rigorous evaluation techniques. Cost-benefit analysis or similar technical evaluation methodologies have not been applied to the BART experience and are beyond the scope of this study. Given the complexity of the social value context in which BART exists and the ITD study has been formulated, BART's effectiveness implications are better elicited by careful and comprehensive analysis of impact findings discussed in relation to various social values and objectives.

PLANNING OBJECTIVES: THREE SETS OF EVALUATION CRITERIA

In order to get at BART's "underlying meaning" for the transportation disadvantaged, implications drawn are based on three different idealized sets of values and objectives. These are intended to be representative of the most relevant considerations about the effectiveness of BART and include the principal concerns of the transportation disadvantaged, particularly as they relate to low income status and living standards. The ITD Project has been particularly concerned with the evaluation of the extent of equity achieved by rapid rail transit in the San Francisco Bay Area. This is consistent with the recent federal emphasis in equity considerations in the provision of transit services.* Two aspects of the equity concept are relevant to the evaluation of BART's effectiveness in the context of the alternative evaluation criteria considered.

- Cost-Benefit Equity: This relates to the distribution of benefits received and costs borne by specific population subgroups. Has the level of positive impacts of BART been generally equivalent to the level of negative impacts on the transportation disadvantaged? Is the distribution of both positive and negative impacts comparable for the disadvantaged and the non-disadvantaged?
- Ability-to-Pay Equity: This is the idea that the distribution of the burden of financing a public investment should reflect differing economic resources within the community. This equity concern is embodied in progressive tax methods which require a higher proportion of income from those with higher incomes.

* W. V. Rouse & Co., a Division of Barton-Ashman Associates, Inc. Equity of Transit Service: Volumes I and II. Prepared for the Office of Civil Rights. Department of Transportation. (DOT-UT-50029). Washington, D.C. June, 1977.

Urban Mass Transportation Administration. Department of Transportation. UMTA C 1160.1, Interim Guidelines for Title VI Information Specific to UMTA Programs. Washington, D.C. December 30, 1977.

The ITD Project has considered three value systems which have been applied in the evaluation of BART's effectiveness as alternative evaluation criteria:

- Objectives of BART Planners
- General Planning Objectives
- Disadvantaged Perspective.

Objectives of BART Planners

The objectives established for the BART system during the evolution of its conception and implementation are perhaps best articulated in two planning documents prepared for the San Francisco Bay Area Rapid Transit Commission by its consultants; the first one in 1956,* and the second one in 1962, just prior to the authorizing bond referendum.** The objectives, expectations and "promises" of the system are of interest a) since they provide a first-order level of criteria to assess BART's effectiveness for the area in general, and the transportation disadvantaged in particular, and b) because they reflect the scope of concern and implicit values of BART planners.

The earlier report clearly indicates that the system was designed to solve the principal "problem" of anticipated peak period auto congestion between downtown centers and expanding suburban development expected to result from high projected growth.

Rapid rail was perceived as the solution to forecasted levels of "intolerable" congestion which would restrict the capacity of the principal corridors to the downtown areas, undermining

* Parsons, Brinckerhoff, Hall and MacDonald. Regional Rapid Transit: A Report to the San Francisco Bay Area Rapid Transit Commission, 1953-1955, New York. BART Impact Program. Metropolitan Transportation Commission, Berkeley. January 5, 1976.

** Parsons, Brinckerhoff, Tudor, Bechtel; Smith, Barney & Company; Stone & Youngberg; and Van Buren Stanberg. Composite Report: Bay Area Rapid Transit. BART Impact Program. Metropolitan Transportation Commission, Berkeley. May, 1962.

the continued viability of these centers. It was anticipated that a regional rapid rail system with a commuter-service orientation would eliminate most of the projected peak-hour deficiencies in the critical travel corridors to the central business districts of the area.

These considerations were formed in terms of problems requiring solutions, rather than as planning objectives based on explicitly formulated goals. Rapid expansion of regional travel demand was viewed as a given, to occur with the continued rapid growth of residential and commercial activity in the suburbs and the anticipated intense development of downtown financial and service sector activities. Implicit within this formulation of the problem are the assumptions that a) this projected regional land use pattern was either desirable or inevitable, and b) that a fixed route rapid rail system of some sort was the desirable or only solution to forecasted transportation capacity problems. It is particularly important for the implications for the transportation disadvantaged that this planning approach is system-oriented, and does not include explicitly formulated group-specific mobility goals.

Congestion reduction as a transportation planning objective implies a) benefit to the traveler within a capacity constrained corridor in terms of reduced travel times, increased safety and convenience, and b) reinforcement of the viability of land use activities served through provision of adequate (or competitive) access. The first of these is probably less of a concern to the transportation disadvantaged traveler, who typically makes fewer trips in general, and even less in heavy commuter-oriented corridors in particular, makes shorter trips, and may also perceive travel time as less important than more affluent travelers.

It is open to interpretation whether or not the intended land use impacts are of benefit to the transportation disadvantaged. However, as the ITD issue investigation findings reported in Chapter III have shown, minority employment opportunities, except for Asians, are typically lower in downtown areas and suburbanization of the region has been associated with increasing out-migration of majority Whites to outlying residential areas. The

implication of these findings are that a regional transportation facility, which is primarily designed to support a suburban residential-to-downtown employment center land use pattern, may be expected to serve the travel needs of the lower-income disadvantaged population to a lesser extent than it will the non-disadvantaged population.

The Transportation System and Travel Behavior Project (TSTB) has concluded that BART has, in fact, increased the capacity of the critical Oakland-San Francisco Bay Bridge corridor, but it has not decreased congestion to a significant extent. This is explained by the phenomenon of induced new auto travel resulting from the initial reduction in congestion on the highway network caused by the diversion of some automobile travelers to rapid rail. The implication of this finding is that it may be difficult to justify rapid rail systems on the primary basis of projected congestion reduction. On the other hand, BART has shown that rapid rail can increase the capacity of a congested travel corridor with minimal environmental disruption. However, the implications for the transportation disadvantaged of increased capacity within a travel corridor are determined by the particular travel needs and patterns of these special population groups. In the case of BART, these considerations were not part of the planning process. In the transbay corridor where capacity improvements have been the most significant, minority use of BART has proved to be lower than for non-minority travelers.

General Planning Objectives: Role of Government in Political Economy

A second perspective in which BART's implications for the transportation disadvantaged can be viewed is a broader set of planning objectives which encompasses the range of possible impacts of a major transportation investment. The investigation of BART's impacts for the elderly, handicapped and ethnic minority population subgroups of the Bay Area, has included environmental, mobility, economic and land use evaluations. Underlying the evaluation of BART's effectiveness in these areas of planning concern are a set of more or

less established notions about the role, purpose and justification of government investment and expenditure in a democratic private property ownership political economy.

These values stem from the liberal tradition in political theory with its concern for both libertarian and equalitarian principles and the role of government to promote and protect them. With respect to the first, government action should reflect its responsibility to provide for the general welfare and to assure some acceptable standard of opportunity for its citizens. With respect to equalitarian values, actions of the public sector may be evaluated in terms of their implicit fairness — the extent to which there is a reasonable balance of benefits and burdens among those affected. This is the "cost-benefit" concept of equity discussed previously.

Given these two ideas, the implications of BART's effectiveness for the transportation disadvantaged may be considered in relation to the extent to which BART has a) enhanced opportunities and the "quality of life" (level of magnitude of net positive impacts), and b) provided an equitable balance of benefits and burdens (distribution of impacts). A brief summary of the implications of BART's effectiveness in achieving these objectives within each of the major impact areas is useful and included here.

Population Parameters of BART Impacts on the Transportation Disadvantaged

The implications of BART for the transportation disadvantaged in each major impact area are not only determined by the attributes of BART's design and operations, e.g. suburban CBD, linear fixed-route rapid rail, but are also shaped by the characteristics of the transportation disadvantaged population which tend to distinguish these special groups from the majority population. Principal attributes of the Bay Area transportation disadvantaged population which in part explain differential levels and types of impacts of BART include distinguishing residential patterns, employment characteristics and household attributes.

Table IV-1 illustrates the relevance of the factors found to be the most important in the ITD Project to BART related impacts. To the extent that these "typical" attributes are characteristic of the transportation disadvantaged population in other regions, BART's implications for these special population groups are relevant to the evaluation of rapid rail systems planning elsewhere. It should be clear that the attributes listed in the table do not describe all persons in any of the subgroups included in the special population groups of concern in the ITD Project. However, their frequency is higher in these groups, and perhaps more importantly, they illustrate many of the factors which relate to the notion of being disadvantaged in our society, regardless of ethnicity, age or physical condition.

Environmental

- Overall, BART's environmental impacts, both positive and negative, have been relatively few and of a low order of magnitude for the general population and the disadvantaged. There has been virtually no regional environmental impact; most environmental impacts are restricted to immediate areas near BART tracks and stations.
- The two principal negative environmental impacts of BART affecting both the non-disadvantaged and the disadvantaged population to some degree are a) parking and traffic problems around stations where auto access levels are high, and b) noise levels in some portions of the system, particularly along aerial segments.
- Negative impacts are generally somewhat more intense in suburban, non-minority areas where auto access levels are higher and aerial segments more common.
- Negative environmental impacts stemming from BART's operations are generally less common in minority areas.

Table IV-1

TYPICAL ATTRIBUTES OF TRANSPORTATION
DISADVANTAGED POPULATION INFLUENCING
LEVEL AND NATURE OF BART IMPACTS

Typical Attributes of Special Population Groups	Impact Type				Transportation Disadvantaged Subgroups		
	Environmental	Mobility	Economic	Land Use	Ethnic Minority	Elderly	Handicapped
Attributes of Residential Areas							
• close-in location		X			X	x	
• high density	X	X			X	x	
• mixed land use	x		X	X	X	x	
• older housing stock			X	X	X	x	
• lower property values			X	X	X	x	
• built-up	x		x	x	X	x	
• better local transit		X			X	x	
Employment Patterns							
• non-CBD workplace		X	X		X	X	x
• non-suburban workplace		X	X		X	X	x
• shorter work trip		X			X		
• lower employment level and status		X	X		X	X	X
Household Characteristics							
• lower income		X	X		X	X	x
• greater transit dependency		X			X	X	x
• larger family size		X			X		
• lower education level		x			X	x	
• non-English language		x			X		
• physical mobility impairment		X				X	X

X = Primary Relevance

x = Secondary Relevance

However, where they do occur they affect more people than a comparable impact does in suburban areas due to typically higher population densities in the older, urban residential areas where minorities live in the greatest concentrations.

- Construction impacts occurred over an extended period and were generally of longer duration and more severe in minority areas where subway construction was more extensive. However, subway segments have generated virtually no negative environmental impacts associated with operations once constructed. This illustrates a clear trade-off in the choice of subway design for a particular segment between one-time, extended and disruptive construction impacts and long-term beneficial impact with the lack of negative operational effects.
- Providing for auto access is a problematic consideration, particularly in urban residential areas where ethnic minorities live in the greatest concentration. Failure to provide parking facilities for BART users, has, in some cases, resulted in long-term on-street parking in areas already congested. In areas where the level of auto access to rapid rail is uncertain, contingency plans need to address options such as purchase of surplus land for construction of off-street parking facilities if needed at a later date, better feeder bus service, or restrictive on-street parking regulations.
- The fact that BART's operations create relatively minor environmental impacts is particularly important for the disadvantaged population. If BART had been less sensitively designed with respect to possible negative environmental impact avoidance, the lower-income ethnic minority community would have been affected disproportionately due to greater population concentrations around BART lines and stations in the urban areas of the region.

Mobility and Accessibility

- BART's impact on area travel has been far less than was expected in the planning for the system.
- The overall impact of BART on the mobility of the transportation disadvantaged, as well as the non-disadvantaged population, has been relatively small to date. Ethnic minority ridership on the system is roughly representative of minority representation in the regional area; however, it is significantly lower for low-income minority persons who are clearly transportation disadvantaged.
- BART has provided significant new mobility gains for a fairly small segment of the region's population — the suburban resident commuting to the downtown areas of San Francisco and Oakland.
- The minimal effect of BART on improved transit accessibility for lower income ethnic minorities results from the fact that, despite higher levels of residential proximity to BART stations in central urban areas and greater transit dependency, BART does not represent significant travel time savings for many of these residents over bus and streetcar service provided in these areas.
- Low rates of low-income minority ridership living in the closer-in areas of the region is the likely outcome of the concept of a linear, fixed-route system connecting the CBD and outlying communities such as BART. Once constructed, relatively little can be done operationally in a cost-effective manner to significantly enhance the mobility of low-income disadvantaged not well served by the design of the system. This is not to say that such service improvements as extended and higher off-peak service levels, weekend service, and progressive fare structure changes would not benefit the transportation disadvantaged.

However, despite possibly significant marginal costs associated with these operational improvements, their impact on increased mobility of the transportation disadvantaged may not be great.

- Conventional bus transit continues to be heavily relied upon by the transportation disadvantaged to serve their mobility needs. In the face of increasing financial pressures on all forms of public transportation, maintenance of adequate levels of bus service is critical to assure an acceptable level of mobility for the transportation disadvantaged.
- BART has shown that extensive consideration of the disabled and the elderly with mobility impairments, in the design of mass transportation facilities can result in a substantially barrier free system. However, the rate of use by the handicapped will probably be relatively low due to the fact that there remain substantial obstacles to barrier-free travel in the total environment, including some inherent to a rapid rail facility (e. g. size of station areas), as well as the lack of barrier free feeder bus services.

Economic, Employment and Financial

- BART, as a new element in the transportation system has apparently had a relatively minor impact on the economic growth of the area or the shifting intra-regional distribution of economic activities. Rapid rail's principal impact on the economy of the Bay Area has resulted largely from the magnitude of the public expenditures associated with it, i. e. direct and indirect income effects associated with BART's construction spending.
- The lack of significant impacts on economic activity is closely related to the small effect BART has had on regional accessibility with respect to other established travel modes, i. e. bus and especially auto travel. Where accessibility gains have been the

least, in the closer-in areas of the region where the transportation disadvantaged live in the greatest concentrations, rapid rail transit has had nearly no measurable economic or land use impact.

- The principal economic benefit implied by BART for transportation disadvantaged households has been direct employment during construction of the system and as part of its continuing operations. The long-term benefits of construction employment, while at levels approximating minority population representation, were limited by the fact that minorities were considerably underrepresented in the non-laborer employment categories. Minority representation on BART's permanent work force is somewhat higher than area minority population representation and is relatively balanced in terms of job type and salary levels, but directly affects only a small percent of the total minority community.
- Since BART's economic benefits have not been found to extend much beyond its direct benefits for BART users, primarily commuters, the incidence of the burden of paying for the system is of major interest in terms of cost-benefit equity concerns. Frequent users of BART represent a fairly small segment of the area's population. A large segment of the population do not receive either direct mobility benefits or indirect economic benefits, but pay the same property and sales taxes as users. Since the low-income transportation disadvantaged make up a disproportionately large share of the non-user group, the fact that BART has generated few external benefits has implied that regional rapid rail has represented a fairly inequitable form of public transportation investment for the area, in terms of who benefits and who pays.

Land Use and Urban Development

- The lack of measurable land use impacts related to BART is in part a result of the minimal effect BART has had on regional accessibility patterns. Correspondingly, the regional distribution of development

activity has not been substantially affected by the introduction of BART into an area where the automobile continues to shape land use patterns. In the non-downtown central areas where ethnic minorities live in the largest numbers, development potentials determined by the real estate market apparently have been the least affected.

- Land use policies supportive of new development and rehabilitation around station areas have been more difficult to implement, and less effective than expected during the planning phase of BART. This has been especially true in minority areas where more restrictive zoning has been implemented after BART around a significant number of stations.
- In these older areas, whatever impact rapid rail access has had on enhancing development potential, it has been overshadowed by other attributes of these areas which inhibit incentives for private development of housing, office or other commercial activities, and generally make them less attractive to developers than suburban locations. These typically include: lack of land availability, physical deterioration of structures, poor access characteristics and congestion, etc.
- The BART experience has shown that there may be significant divergence in land use objectives among planners, developers and residents for neighborhoods where a rapid rail facility is introduced, including older urban areas with significant concentrations of low-income minorities. The goal of coordinating new construction or redevelopment at higher residential densities or of "higher" land use types in order to support or justify the new rail facility is likely to meet with strong opposition in these neighborhoods where potential redevelopment may be perceived as a threat to the character of the community.

- * Uncertainty about land use impacts of a new rapid rail station in the older, transitional urban areas may be responsible for inhibiting public or private rehabilitation which could be of potential benefit to low-income neighborhood residents.

Summary Implications: General Planning Objectives

The summary of principal implications regarding BART's effectiveness reveals a great deal of interrelationship among the implications emerging from each area studied in the ITD Project. Integration of these implications emerging from the study of each impact area provides for an indication of the overall effectiveness of BART in terms of the general planning objectives discussed previously: a) the net level of benefits generated, and b) the degree of their equitable distribution.

As an innovative, major new element in the region's transportation system, BART's measurable positive impacts to date have been unexpectedly low in terms of regional system effects, benefits to the general population, or benefits to the transportation disadvantaged of the area. Benefits of BART, as a fixed-route, rapid rail commuter-oriented system have so far been essentially restricted to direct mobility impacts. These have been limited to a relatively small segment of the BART District population. The highest level of benefit has accrued to the more affluent, predominantly White suburban residents who work in the downtown areas of the region. The extent of benefit to financial interests, employers, and the business community in the CBD areas resulting from the improved accessibility to downtown areas provided by BART remains open to interpretation. It is an important implication for the transportation disadvantaged that relatively few indirect beneficial effects of BART have been experienced in environmental, economic or land use impacts, since direct mobility benefits have been low for the low-income population.

The implication of these findings is relevant to transit planning in other areas, particularly for areas considering fixed guideway systems of a regional scale. The BART experience has shown that the construction of a heavy-rail system is costly. Operating costs per trip on BART are also relatively high, and higher than conventional transit in the area. It may, therefore, be difficult to justify similar regional rapid transit systems on the basis of improved mobility, where anticipated benefits would be restricted to travel time and cost savings for a relatively small portion of the population.

The principal implication for the transportation disadvantaged emerging from the BART experience relates to the commuter-oriented attributes of the system. For rapid rail systems, or line segments of such system, which are designed to primarily serve outlying areas of a metropolitan area, the findings of the ITD Project's analysis of BART, suggest that a relatively low level of direct mobility benefit, as well as negligible indirect benefits, may be anticipated for the low-income population living in the greatest concentrations in the central urban areas of the region.

Disadvantaged Perspective

In addition to considering both the objectives of BART planners, and broader established public planning objectives, it is necessary to examine the implications of regional rapid rail systems for the transportation disadvantaged in light of the perspective of the disadvantaged population. Of course, there is not one single perspective which encompasses the diversity of concerns and points of view of the disadvantaged population. The intent in the ITD Project is simply to assure that the implications of BART's effectiveness for the transportation disadvantaged are broadly enough drawn to address the special interests of these groups, particularly as they relate to income status, political access, and institutional or other forms of discrimination which constitute a large part of the meaning of "disadvantaged" in our society.

Two basic notions or expectations about the requirements of appropriate public sector investment may be considered in relation to the implications of rapid rail commuter-oriented transit for the disadvantaged. First is the concept that a major government expenditure in an urban area should be evaluated, at least in part, in terms of the extent to which it promotes greater equality of opportunities or leads in the direction of reducing existing social and economic inequities. These objectives may be termed "affirmative action" considerations, since they are implicit in the body of relatively recent legislation of that title in the areas of business, employment and education. A second important concept here is the notion of "opportunity costs", i.e. what could have been done with a similar level of expenditure that may have more effectively served the special needs of lower income ethnic minorities, elderly or the disabled.

Affirmative Action Objectives

The level of BART's direct mobility benefits for the low-income transportation disadvantaged has been relatively low, and more importantly in this context, less than that for the majority population — especially those living in outlying suburban areas who commute to the central cities. The income and educational profile of the ethnic minority segment of the population who does use BART is more like that of majority White BART riders than it is of the profile of the area's ethnic minority community. Thus, it is clear that BART's direct benefit distribution has not been progressive in terms of providing proportionately higher benefits for those who are in fact the least mobile. This is an important implication of the BART experience, since it contrasts with most conventional urban transit systems which have proportionately higher ridership of low income, minority, elderly and physically disabled persons than their representation in the population.

As discussed in Chapter III, BART's direct employment benefits for ethnic minorities were limited by hiring patterns during the construction period, which represented less vigorous affirmative action practices than

would be required by current federal directives. BART has shown that affirmative action in hiring and promotion can be effective in the operational phase of a rapid rail system. However, BART's impact has been limited by the smallness of its work force, which is partly related to the fact that it is less labor-intensive than conventional bus operations.

The "costs" of BART have included some negative environmental impacts, particularly those associated with its construction. But the primary costs of BART have been the financial burden imposed on residents of the BART District who pay property (directly or indirectly) and retail sales taxes to finance the annual debt service of a large share of the capital costs and the growing operational deficit of the system. The effect of BART's financing plan, which relies heavily on local regressive taxes, is that those with the least financial resources bear the greatest relative burden of rapid rail transit in the Bay Area. This relates directly to the ability-to-pay concept of equity discussed previously.

Opportunity Cost Considerations

Because of the special needs of the disadvantaged and because of the magnitude of the public expenditures involved, the implications of BART for these groups involve consideration of BART's effectiveness with respect to alternative public sector investments foregone. This relates not only to alternative transportation projects, but also more broadly to alternative investments or programs in other sectors.

The implication arising out of the BART experience is that if providing substantial mobility or other benefits to the disadvantaged is to be a major goal of a transportation expenditure, alternatives to a commuter-oriented rail system may be more effective. Since BART's indirect environmental, economic, and land use benefits have not been significant, a rapid rail system such as BART probably needs to be justified in

terms of its direct transportation impacts. Alternative investments specifically directed at increased mobility for the transportation disadvantaged might be of greater benefit. Because of significantly higher ridership levels of low income persons on bus and streetcar systems, it is likely that conventional transit, combined with special consideration of the needs of the elderly and handicapped, would serve the transportation disadvantaged better than a commuter-oriented regional rapid rail system.

Also, in light of the opportunity cost notion, the disadvantaged population may perceive that large scale expenditures are more desperately needed in other sectors of community life than transportation. This is not to say that the financial resources allocated to BART's construction or operations would be necessarily available for other needs. In fact, the BART Impact Program has not evaluated this complicated issue, but the opportunity cost notion does raise the question of whether or not the large expenditures associated with the additional investment in the transportation infrastructure represented by BART is consistent with the priorities of the disadvantaged community. A recent conference in the San Francisco Bay Area has evidenced the strong concern of minority representatives for new plans and programs in housing in particular, as well as health, criminal justice, environment and transportation.* The existence of differing social priorities has implications for the planning of major transportation investments as discussed in the next section. It is also relevant to the concern for accountability of special functional jurisdictions, such as the BART District, and their capability to be responsive to competing social and political demands in the community.

* Association of Bay Area Governments. Regional Planning: Threat or Opportunity to Minority Communities. A Report on the conference held on November 13 and 20, 1976. "The Region Vs. Neighborhood: Threat or Opportunity." Berkeley, California.

POLICY IMPLICATIONS OF BART FOR THE TRANSPORTATION DISADVANTAGED

Based on the implications developed above regarding the degree of BART's effectiveness vis-a-vis the transportation disadvantaged, a number of important implications may be drawn for local, state and federal transportation policy. Four general policy areas in which the BART experience suggests important implications for rapid rail systems and the planning of major transportation investments are:

- Planning Process
- System Design and Configuration
- Operational Considerations
- Financial Plan

PLANNING PROCESS

Perhaps the most important policy implications of the BART experience for the transportation disadvantaged are related to the planning process in which major transportation investments may be considered. The decision to commit substantial resources to any major new transportation system element should occur only after a thorough and open planning process which is sensitive to a broad range of social values. This is particularly true for rail rapid transit investments as reflected in recent Federal planning requirements outlining the conditions of eligibility for Federal assistance.* The experience in the Bay Area is one which illustrates a planning process where the regional rapid rail alternative was decided upon in the early

*Urban Mass Transportation Administration. Department of Transportation. Major Urban Mass Transportation Investments: Statement of Policy. Issued in "Federal Register", Vol. 41, No. 185 - Wednesday, September 22, 1976.

Urban Mass Transportation Administration. Department of Transportation. Policy Toward Rail Transit: Statement of Policy. Issued in "Federal Register", Vol. 43, No. 45 - Tuesday, March 7, 1978.

stages, and much of the subsequent process appears to have been pursued in order to establish feasibility and promote acceptance of the choice made.

Implications relative to the transportation disadvantaged are found in four aspects of the planning process — determination of goals and objectives, extent of participation, scope of alternatives, and evaluation methods.

- Goals and objectives developed as part of the formulation of plan alternatives should be broad enough to reflect a range of transportation and land use objectives which are related to explicitly defined political, economic and social goals. System-oriented objectives, such as increased corridor capacity, should be supplemented by goals explicitly stated in terms of the welfare of specific groups.
- The determination of public sector goals is by definition a political process. It is strongly affected by the nature and extent of direct participation provided for, or the openness of, the planning process. The BART experience implies that where the scope of participation is limited, primarily to business and engineering interest advocates of rapid rail, occurring largely outside governmental agencies, goals established will be narrowly defined. A balanced planning process requires participation of a range of community interests in all phases, including the transportation disadvantaged, with a strong role for local politically responsive government.
- The scope of alternatives considered should encompass a set of fundamentally different choices which together relate to the entire range of diverse and potentially competing objectives established in the process. In any specific corridor consideration should be given to a variety of technologies, for example, rapid rail, light rail, express and exclusive busway, people mover, and augmented conventional transit systems.

- Evaluation of alternatives should occur in an open process involving the direct participation of representatives of the transportation disadvantaged's interests. Analysis of alternatives should not be limited to technical system effectiveness criteria, but should include broad social and economic concerns. Estimation of the group-specific impacts of each alternative is essential.

DESIGN AND SYSTEM CONFIGURATION

Once the decision has been made to implement a fixed-route rail system, a number of policy-oriented implications of the BART experience for the transportation disadvantaged are relevant to the design and configuration of the system. Many design decisions will involve important trade-offs between competing objectives, particularly if maximization of positive impact for the transportation disadvantaged is one goal in the design process. In the BART experience this was not an explicit objective, but rather a hoped for incidental effect.

- The determination of the service area is critical to the level of impact rail systems will have on the transportation disadvantaged. Because of residential and employment locational patterns which distinguish low income ethnic minorities from the general population, suburban-to-CBD systems will have the least mobility impact for these groups. However, the commuter-oriented system probably will have the largest net impact on total regional accessibility in terms of average travel time savings. Also, a system design that concentrates more mileage and stations in the central cities, and thereby provides more opportunities for mobility to the disadvantaged, will have a higher cost per mile because of higher land values and, usually, the choice of a subway configuration.
- The cost-effectiveness of direct service to non-CBD, blue collar employment centers should be thoroughly evaluated in the design process. Adequate bus-egress systems need to be considered where direct rail access to outlying work-sites is infeasible in terms of costs compared to anticipated demand.

- Trade-offs between severe short-term construction impacts and long-term mobility effects should be evaluated within a particular corridor, especially in urban residential areas, where the low-income live in the greatest concentrations. Where disruptive environmental impacts may be expected, corridor and alignment considerations should weigh these effects against potentially low levels of travel service for the transportation disadvantaged.
- There is a clear trade-off between system speed and degree of access to be provided. Higher speed systems, with fewer and wider spaced stations, such as those represented by the suburban line segments of the BART system, will serve longer distance travelers best. Rail systems with a larger number of stations and more closely spaced, will operate at lower speeds but may serve more riders. As in the central area segments of BART, they will serve more short, non-auto access trips, which are characteristic of travel patterns of the transportation disadvantaged.

OPERATIONAL POLICY

Operational policies would appear to be of secondary importance to system design and configuration aspects of rapid rail systems for the transportation disadvantaged, with the exception of the disabled. However, several implications for operational policies are found in the ITD study of the BART experience.

- Adequate off-peak, evening and weekend service levels may be more important to the transportation disadvantaged than for the general population, given greater transit dependency and differing travel needs. An alternative is to provide bus services designed specifically to satisfy those needs. In determining the cost effectiveness of the two alternatives, the marginal net operating costs of the two services should be compared.
- In linear systems such as BART, where inter-modal transfers are required for most potential trips, short headways are especially important in order to minimize total travel times and to compete well with bus transit for shorter distance trips. Thus, in the close-in urban residential areas

with high concentrations of low-income persons, frequent service may be especially important for rail transit in order to provide significant mobility increases for the disadvantaged.

- Schedule and equipment reliability should be a high priority operational objective and may be particularly important to lower-wage and ethnic minority employees on fixed work schedules and the elderly and handicapped for whom delays requiring long waits may be especially onerous.

FINANCIAL PLAN

The implications for the transportation disadvantaged of financing new rapid rail elements of regional transportation systems relate directly to the equity considerations discussed previously.

- In order to achieve an equitable balance between the benefits received and the costs assumed by different population groups, the financing plan of a major transportation investment should require that frequent users of the system, as well as the property owners most directly benefited, pay a larger share than they do for BART. This is implied due to the relatively minor indirect economic, environmental or social benefits which may be expected for the substantial portion of the metropolitan population, including a large number of low income persons. Higher fares for longer distance travel, special benefit tax districts, or tolls levied on auto use in the corridors served, are all alternatives which should be evaluated in order to promote balance between benefit and burden.
- Equity considerations also require that revenue sources used to finance capital costs and operating deficits be based on the principle of progressive taxation — increasing proportion of income as income increases. This objective is especially significant in the case of a regional commuter-oriented rapid rail system like BART, where higher ridership rates among the more affluent segments of the regional population may be expected.

An important implication of the BART experience for the disadvantaged is that equity considerations in local financing of regional rail systems may become secondary to other objectives unless special efforts are made to include them in the development of the financial plan. Where planning has not realistically anticipated relatively high and increasing costs, local planners are likely to rely on funding sources which are certain, stable, and have the appearance of taxing everyone equally. Regressive public revenue sources, such as property and sales taxes, are likely to be the only available alternatives unless innovative legislative initiatives at the local and state level have been pursued. Development of more progressive State and local taxes, and the use of Federal assistance derived from taxes on personal and corporate income, are critical in promoting equitable financing where the decision has been made to implement a rapid rail system.

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